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Editorial

Toward the Formation of a Library Editors' Council

Publishers in general, and editors in particular, are popularly regarded as a predatory breed. The former are assumed to be driven by an insatiable thirst after the life blood of the emaciated author, and the editors are believed to be engaged in a ceaseless striving to "scoop" the opposition in the most competitive of all professions. We do not hold with either of these views. We know many publishers who treat their clients with the utmost consideration and generosity, and such distinguished names as Charles A. Dana, Joseph Pulitzer, and William Allen White are sufficient to remind us that the history of American journalism is rich in editors of high moral purpose and social vision. To be sure, the task of the editor is inherently personal, but this is not the same as saying that it is intrinsically selfish.

Today *documentation* is popular as it has never been before, and its scope and applications have widened spectacularly since the pioneering days of the *Journal of Photographic Reproduction*. Within recent months a group within the Special Libraries Association has petitioned for the formation of a Division of Documentation. In the American Library Association the Division of Cataloging and Classification is seriously considering an alteration of its name and a widening program of activities to include the interests of the documentalists. We ourselves have urged the college and university librarians to interest themselves more actively in the principles, methods, and techniques of documentation. We welcome these developments; we hold that any contribution to a wider understanding of and appreciation for documentation benefits the entire movement. Documentation is a vigorous and expending field and there is room in it for the work of many hands and the intellectual contribution of many brains. We take pride in the fact that *American Documentation* is not copyrighted, and that the Institute which sponsors it exercises no proprietary right over the field.

But this unrestrained enthusiasm should not be permitted to proliferate without direction and coordination. A "bandwagon" is scarcely a vehicle for progressive transportation. We have long been of the opinion that all library publications would profit from greater cooperation and more precise definition of purpose and scope, and the sudden popularity of the documentation movement intensifies this need.

Today there are at least some half-dozen major library periodicals which should report the developments in documentation to their respective clienteles, but adequate "coverage" is not to be achieved through fortuitous development or senseless competition. We are convinced that the time is right for the promotion of a council of editors of library publications in which all could work together for a better definition of policy and delineation of spheres of activity. This is no pretentious undertaking that is here proposed; it needs no foundation support for its inauguration, or any elaborate machinery for its implementation. The only requisites are a dedication to the improvement of the profession and a sincere desire to work together to that end.

*A CONTINUING INDEX TO OUR STOCKPILE OF KNOWLEDGE**

*ELMER HUTCHISSON***

We are living in a world in which our stockpile of knowledge is growing at an ever-increasing pace. Unfortunately, the intellectual capacities of the human being to whom this knowledge should be useful are changing very little. There is, in fact, no evidence that able men of today excel able men of years gone by. How then can mankind cope with this vast store of knowledge which has been built up and which daily becomes more unwieldy? This, to my mind, is a major intellectual problem facing society today.

Some insight into the difficulties which exist in making knowledge useful is gained from the rather natural division of knowledge into two broad areas: accumulative and non-accumulative. Typical of the first area are the physical sciences in which, through the organization of knowledge, it has become possible to overcome in some measure the great handicap that minds of men have not grown over the ages. We find, for example, in this area that a college sophomore is able to solve a problem in mechanics that would have stumped Newton. In the realm of atomic structure, a graduate student of today has a more complete understanding of the atom than Bohr or Einstein did thirty years ago.

Thus, through a process of organization, constant simplification and compacting by the discarding of obsolete knowledge, ordinary human beings are able to assimilate almost all of the useful knowledge being accumulated in certain narrow branches of mathematics, physics, chemistry and a few other fields. However, even in this accumulative area there are signs that, in many fields, knowledge is building up so fast as to be getting out of hand. This is a problem to which I would like to direct your attention and to review for you some recent activities that bear directly upon it. In most of this paper I will restrict myself to the accumulative field and actually to physics, but before going further, let us look briefly at the other broad area, that of non-accumulative knowledge.

In the arts, for example, one may justly raise the question, is the modern painter able to profit by the knowledge which has been gathered for centuries and thereby paint a finer picture than could Michelangelo? Or, in literature, is a modern play likely to be better than those of Shakespeare? Or, in world affairs, have we some way of utilizing the experience of centuries and thus be able to see clearly better solutions of international problems today than were available a few decades ago? The answer to most of these questions is a very definite, "No." Many, in lamenting our inability to handle adequately these problems in human affairs, set up the recent progress in science as a bogy which needs to be knocked down before progress can occur in these more complicated areas. This attitude can do harm both to the natural and the social sciences. It would seem far more fruitful to look to the methods of the physical sciences for suggestions as to ways in which progress could occur more rapidly in the social studies. Two examples of promising developments in the non-accumulative area of knowledge come from the University of Chicago. One is N. Rashevsky's recent work on a mathematical approach to history[1] and the other is Mortimer J. Adler's plan of a social science index which he calls the "Syntopican" in which the thinking of all ages on a given concept, such as beauty, love, truth, etc. is abstracted and compared. These are two diametrically opposed approaches but are nevertheless practical beginnings of organization in a tremendously difficult field. It is hoped that similar attempts will be made in other areas of knowledge which are now non-accumulative.

*Originally presented at the Case-Reserve Library Conference, Cleveland Ohio. November 1953.

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[1]N. Rashevsky - Bulletin of Mathematical Biophysics, June and September, 1953.

In most fields of knowledge much too much has been written and is being written for any one individual to follow. Much of it is repetitious. If we are to be able to use our knowledge effectively, some system is necessary which will enable each of us to pick out those bits of information or recorded thought which pertain directly to the problem to which we are currently applying ourselves. The first step in providing such a system is to develop some form of abstracting since none of us has the time to search out and obtain, let alone read, a long paper or a book unless we know that it or a small part of it relates directly to our particular problem. Obviously, also, if we want to cover all written material we cannot restrict ourselves to those particular languages which we happen to read easily. It is often likely that men of many different nationalities are working simultaneously on closely related problems; hence, to be of maximum usefulness, an abstracting service must be international in scope and language.

In the accumulative area of knowledge, as contrasted with the non-accumulative, emphasis is ordinarily placed upon current work. The constant checking, revision and simplification going on in the accumulative area enables great masses of early work to be declared obsolete and we retain only a few rather simple generalizations which can readily be placed into textbooks or reference books. I would cite analytical mechanics as an example, par excellence, of this process. However, even though mechanics and other branches of physics are among the most highly organized disciplines in the accumulative area, there are still many problems in keeping abreast of their literature. .

In the field of physics, abstracting journals in several different languages exist and while they have undoubtedly contributed to the rapid pace with which physics has advanced in the past few decades, this very pace has made physicists most critical of the abstracting services available. The American Physical Society set up a committee on science abstracts to study this matter as far as English language abstracting service is concerned, but the committee found it difficult to make recommendations to the Society for improvements because it lacked definite knowledge as to the type of abstracting service physicists needed and would be likely to find most useful. To obviate this difficulty, a successful appeal was made in 1948 to the Office of Naval Research to support a rather comprehensive investigation of the problems associated with the abstracting of physical literature.[2]

One of the principal tasks in carrying out this study was that of obtaining a sufficiently well-averaged use which physicists made of abstracts. To obtain a representative sample of American physicists, use was made of some ten thousand cards which had been prepared jointly by the Office of Scientific Personnel and the publishers of American Men of Science. These cards included all those scientists who had indicated to these agencies that their major interest was in the field of physics and, certainly included the great majority of all physicists in America. In as random a fashion as possible, something over two thousand of these names were chosen and questionnaires were sent to them. Approximately sixteen hundred and fifty questionnaires were returned. This large return is in itself a good measure of the physicist's concern with this problem. The distribution of these physicists is of some interest. For example, 30% of the physicists were found to be between 26 and 35 years of age, 49% between 36 and 50, and 20% over 50. It was also found that 56% were from educational institutions, 14% from government agencies and 30% from industry, business or foundation laboratories. As far as subject interest is concerned, 33% indicated interest in general physics, 19% a special branch of classical physics and 36% atomic nuclear or molecular physics, while 12% indicated mathematical or applied physics.

After the results of the questionnaire were tabulated, it became clear that almost without exception the replies were independent of the age groups and of the types of institutions from which the individuals came, thus providing a strong likelihood that the sampling was valid.

It was found that half of the physicists use abstracts almost wholly as a guide to the original literature and the other half use abstracts both as a guide and as a substitute for the original. Replies to another question indicated that somewhat more physicists use abstracts for reference purposes than for keeping up-to-date.

The interest in current work was, however, evidenced by the fact that most dissatisfaction

[2]Dwight E. Gray - Physics Today 2, 20 (1949), Dwight E. Gray and Robert S. Bray - Amer. Jour. of Phys. 18, 274 (1950).

is with the lag between the publication of an article and its abstract. It was found, for example, that only 14% rated the existing services as satisfactory from the point of view of promptness. There was little criticism of the quality of the abstracts. There was more dissatisfaction than satisfaction with the indexing as it was done then. However, much improvement in indexing has occurred during the last few years.

About half of those replying agreed that the journal coverage is good, the other half rated it only fair or poor. In reply to another question, wide coverage was overwhelmingly given as the most important characteristic of a good abstract journal. There was a clear indication of the need for greater coverage in borderline fields.

While the American Institute of Physics study was still under way and as a result of a world-wide feeling of inadequacy in coping with the mounting mass of knowledge in the scientific area, UNESCO called an international conference on science abstracting in Paris in June 1949. This conference recommended that UNESCO cooperate with appropriate international scientific bodies in setting up a committee of users and publishers of abstracts to consider physics abstracting problems at an international level. The conference further recommended that a committee, composed of representatives of organizations responsible for existing abstracting services and interested international unions, be convened to consider the feasibility of establishing a single international physics abstracting journal under a single internationally-controlled organization. The availability of the results of the American study helped greatly in these international discussions.

A committee of users of physics abstracts met under UNESCO auspices in Paris in December of 1949 for preliminary discussions of this plan. At the same time the International Council of Scientific Unions (ICSU) appointed four members to a UNESCO subject committee on physics abstracting to take definite action. These members, as well as representatives of "Physics Abstracts" and the "Bulletin Analytique," met in London in September of 1950.

It soon became clear that a single international abstracting journal had many disadvantages as well as advantages. To be really international, a physics abstracting journal would need to carry either abstracts, of which some would be in one language and some in another, or duplicate abstracts in more than one language. If one of the existing journals in one language were modified to include abstracts partly in one language and partly in another, it is quite clear that the usefulness of this journal would be greatly decreased, especially among younger students who have not yet acquired facility with foreign languages. If abstracts were duplicated in several languages, each subscriber would receive material he would not use, and each individual's cost would be considerably increased.

In view of this situation the committee decided that a preferable idea would be to plan an international abstracting cooperative plan rather than a single international journal. In this plan there would be several abstracting journals, each in a separate language and, wherever possible, existing journals would constitute the official organ of the plan. For example, the existing "Physics Abstracts" could be considered the English language journal and the existing "Bulletin Analytique" would constitute the French language journal. Under this proposal each journal would retain a measure of its own individuality and yet be part of the international plan. The committee recommended further that this plan be under the general sponsorship of either the International Council of Scientific Unions usually referred to as ICSU, or the International Union of Pure and Applied Physics (IUPAP). With such sponsorship it was hoped that at some later date physics abstracting journals in other languages might also become part of the same plan.

The definite improvements which it was hoped might be achieved through this proposal were:

1. The general acceptance of a principle which had been adopted in American physics journals and in some British journals of including an author's abstract with every original research paper published. It was recognized that in a few cases authors would be too close to their subject to prepare objective abstracts, but on the whole the abstracts would be far more authoritative than if prepared by professional abstractors and most importantly would be available simultaneously with the article.

2. The sending of the author's abstract in page-proof stage by air mail to the abstract editor in the corresponding language — i.e. physics journals in English would send abstracts to "Physics Abstracts," journals in the French language to the "Bulletin Analytique," etc. A

saving of at least two months often occurs in this process.

3. Abstract editors would, by mutual agreement, exchange abstracts, thus decreasing the lag in publication time of abstracts and assisting each abstract journal in obtaining wider coverage.

4. Under ICSU or other international sponsorship, increased cooperation among abstract editors would occur to obtain the most efficient classification and indexing methods,

At a meeting in July of 1951 in Paris the Joint Committee for Physics Abstracting of the International Council of Scientific Unions endorsed the recommendations of the UNESCO subject committee. At this meeting, which was full of international good will, it became clear that the editor of the "Bulletin Analytique" would be glad to assist the editor of "Physics Abstracts" in getting journals and other publications in the French language and likewise the editor of "Physics Abstracts" would help in getting material in the English language. It was recommended that the bureau of ICSU should accept this international abstracting plan as a normal permanent scientific activity of the Council. It was further recommended that the ICSU Joint Physics Abstracting Committee be dissolved and that a small new international abstracting board be constituted.

These recommendations were carried out by the bureau of ICSU at its meeting in London in May 1952. In adopting the general title of an international abstracting board it was expected that eventually abstracting in many sciences would be covered but initially the board was to restrict its activities to physics. Provision was made for an observer from both chemistry and mathematics on the board so that its activities could easily be extended if conditions justified these extensions. Initial financial aid was provided by a grant from UNESCO. An office of the board was established in Paris with Professor G. A. Boutry as Secretary.

During the year 1952-53 many steps were taken toward fulfilling the objectives outlined earlier. The principal results were:

1. Author's abstracts were extensively adopted by physics journals in the United States, United Kingdom, the Netherlands, Belgium, France and Italy.

2. Arrangements were made for articles and abstracts to be sent in page-proof form by air mail to the corresponding abstract journal from 45 different physics journals in 10 countries. In cases in which only one copy was provided, a photo-copy was immediately made and sent to the other abstract journal.

3. Assistance was given to cooperating journals on receiving and abstracting of non-periodical publications.

4. Complete world-wide lists of physics periodicals are being established.

5. Discussions have been initiated on improving classification schemes.

6. Assistance has been given to journals in receiving and abstracting of Soviet physics papers.

The first official meeting of the new ICSU Abstracting Board took place in Strasbourg on July 6-7, 1953. At this meeting statutes and by-laws were adopted so that the Abstracting Board would have legal standing. These were prepared in accordance with Belgian law so that the Board would have a legal existence in that country. With its legal status confirmed, the Board would be in a position to contract with UNESCO to perform its general functions. Membership on the Board consists of representatives of the international unions interested in abstracting and representatives of the cooperating abstracting journals.[3] Although the IUPAP was the first adhering international union, the International Unions of both Mathematics and Chemistry send representatives to the meetings and it is hoped that they will join in the relatively near future.

The meeting in July 1953 was also attended by two representatives of the "Physikalische Berichte" who petitioned the Board for membership in the activity. This petition was accepted and the German abstracting journal has become an equal partner with the English speaking and French speaking abstracting journals.

At this meeting considerable progress was made in improving the exchange of abstracts among abstracting journals and the reduction of the time lag between the publication of an article and the publication of its abstract.

[3] An Executive Committee, meeting once a year, was established consisting of: President of the Board, Professor P. Bourgeois of Belgium; Vice President, Dean Elmer Hutchisson, representing IUPAP; Secretary, Professor G. A. Boutry, representing ICSU; Professor A. V. Hill, representing both the United Kingdom and ICSU; Professor J. Wyart, representing France.

In July 1954 a meeting of the Executive Committee was held in Brussels. At this meeting word came from the secretary of the Soviet Academy of Science that the Soviet Union would like to become a member of the International Abstracting Board. The Soviet application has been accepted and it is expected that an exchange of journals and abstracts from the Soviet Union and the other cooperating countries will get under way during 1955. The American Chemical Society has also requested that "Chemical Abstracts" become the recognized English abstract journal in chemistry under the Abstracting Board. The "Bulletin Analytique" would then be the French counterpart in chemistry. Final arrangements for this extension into chemistry are expected to be made at a meeting in Zurich during July of 1955.

Each abstracting journal has developed its own classification and index and has been actively improving them with the assistance and encouragement of the Abstracting Board. No attempt has yet been made to apply machine methods to the indexing but this is a step which will receive the attention of the International Board at its future meetings. Thus in one field a first step on an international level has been taken in making our growing stockpile of knowledge in physics and chemistry completely useful.

*SOME CONSIDERATIONS REGARDING THE MECHANISM OF THOUGHT**

*HENRI CLAVIER***
*Translated by Normat T. Ball****

A classification is an intellectual structure intended to facilitate, to strengthen, and to extend the mental activity of anyone who uses it. The employment of classification in individual work makes it a useful working tool, as it permits one to discover over-all perspective regarding phenomena and ideas and to reorganize in a logical order the material which it assembles. In the realm of documentation, the employment of a classification adopted by many organizations provides a means for utilizing in common the experience of all. It does not acquire its full value for this purpose unless each user of the collections completely understands the mechanism so as to recognize for himself the full depth of the divisions. He must also clearly understand the contents of each of them.

A classification will always be useful in connection with individual thinking, whether for a single investigator, the editor of a collection of abstracts or of bibliographical lists, as well as for users of all of these systems which are made available to the public.

Before studying the theory of classification, it will be desirable to begin by recalling to mind experimental concepts regarding the mechanism of thought, independent of any philosophical theory. It is desirable to collect and express the facts and not to express *a priori* principles.

Major Aspects

It is in the fire of action that the thought manifests itself in the most spontaneous fashion. When a man acts, he mobilizes his entire experience in order to adapt his conduct to the object he wishes to attain. Those of his ideas previously stored in his mind which are thus useful to him jump immediately into the full light of his consciousness. He estimates on the spur of

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**A biographical note on M. Clavier appears at the end of this article.

***National Science Foundation, Washington, D. C.

the moment the relative importance of each idea and coordinates them into an instantaneous synthesis, makes a decision and at the same instant puts it into action, releasing his habitual mechanisms. Depending on the complexity of the problem, the elements applied are more or less numerous. There is no *a priori* rule which determines the number. It depends upon circumstances on the one hand and on the richness of the experience of the man on the other.

An orator who responds to an interrogation, a sailor who sees looming up the obscure and uncertain mass of an approaching shape in the fog, do not let themselves be disconcerted by the unexpectedness of the situation. They face the problem with *sang-froid* and appropriate reactions, gestures, or orders to meet the situation without delay and without deliberation.

In such action, it is frequent that thought presents itself thus as a universal and spontaneous phenomenon where the entire man expresses himself. In certain cases, to various degrees, and according to the difficulty of the problem, a physician who makes a diagnosis of a patient, the head of an enterprise who receives a demand from a delegated workman, a commercial representative who seeks to convince a prospect, etc... act according to such processes. All of their senses are strained, their combative effectiveness under tension, their awakened attention, all of their spirit is alert as on a warship at battle stations. Even the boxer is not simply a machine to give blows of the fist and to receive them; his thought is never absent from the struggle. It is this which creates the will to win.

The spectacle of such activity may suggest a comparison between automatic machines and human action. However, the adaptation of the man is infinitely more flexible and more varied. However unexpected may be an event, the best of men always find it possible to improvise a remedy. Action is not the only field in which man is able to develop an orchestration of the elements of his experience. The same complexity may be found in meditation even though it does not have for its objective the satisfaction of an immediate need. Here the thought wanders through the world of ideas and concepts; to the extent to which it conceives of a conclusion to a question, it establishes a synthesis which takes account of all themes encountered, their incorporation, and any new ideas which emerge from consideration of them. Testimony is also a synthesis where intuition and its effectiveness play a role equally legitimate (in the eyes of some) as those of reason in other occasions. Synthesis — and always synthesis — provides poetic, artistic, scientific, or technical creativity where the spirit proceeds from a disjunction of habitual associations and discovers new associations along an original pattern.

Such accomplishments suppose a very large background of experience. Only a continuous exercise of these activities can bring into the conscious from the subconscious very complex schemes. Thus a very fugitive indication may be enough to release the mechanisms of reaction; the attention may seize upon this specific one signal, the thought recognizes it and it is a gushing fountain which illumines the situation all of a sudden and which calls to mind convenient means to make all necessary arrangements; a question is presented and the answer rebounds like a tennis ball. The myth of Minerva emerging fully armed from the brain of Jupiter always symbolizes for us this outpouring of an efficient and successful thought.

Change of "Degree of Magnification"

When a scientific observer uses a rotating microscope having several objectives with different degrees of magnification, he arranges to view the object which he is studying with the smallest degree of magnification, then changes lenses so that he may examine the details of this object and does not pass to the greatest degree of magnification until he has become sure that he has within the field of his vision the detail he wants. At each step, the surface in view becomes smaller but the details become more distinct. In its spontaneous operation, thought proceeds in a similar manner. According to the requirement of the moment, it may view the problem very superficially with the reality of its environment and then carry the attention toward a striking detail which may bring forth simultaneously a crowd of characteristic details which individualize completely the study. In the first case we grasp a "type," a broad view, to a generalization. As we walk along the sidewalk, we are aware of passers-by of whom we grasp very exactly the speed and congestion for which our attention is directed only to avoid jostling; however, as to the rest, we grasp a sort of silhouette which comes into the fog of our inattention. Alongside of us

automobiles pass in a noisy flux to which we are completely indifferent as long as we are on the sidewalk. The stores remain confused in our mind and a shoe store does not attract our attention any more than the pastry shops. Then when one of our centers of interest is alerted by an impression received by our senses or the unexpected causes us surprise, our thoughts suddenly are localized on a detail: the rosette of a decorated man, the glance of a pretty woman, or a taxi which one notices passing and which one would like to hail. Presently we grasp a detail and pass from a generalization to a more specific thought as in the example of the taxi. In this case we see all sorts of vehicles passing before our eyes, leaving a confused impression in our mind until we see the single species which interests us, and when the first taxi appears our acts are released without the intervention of our will. Our mind is thus more flexible than the microscope of which we just spoke for in certain circumstances it may grasp the richness of details while still retaining the broad view of the field, to a large part thanks to a memory which presents them simultaneously. For example, in the passing crowd we may distinguish a recognized face. Immediately our instantaneous synthesis brings back all the traits and attractions and clothes of the person. The variation of a trivial detail strikes us. Our friend appears fatigued or happy. He has changed his necktie and we take account of all these observations in approaching and adjusting ourselves to his humor.

By a natural fluttering action of our thought, we pass from one to another of these points of approach as electrons jump from one orbit of the atom to another without ever stopping in any intermediate position. Similarly, we jump from the general to the particular without ever stopping at intermediate levels which might be imposed on us by deductive thought and which might mark for us known words or conventional locutions. We go to taxicab without passing through motor vehicle, four cycles, for transport of people, etc... in the same manner we pass from animal to horse without stopping at vertebrates, mammals, equidae, etc.... After the word of great extension, we slide freely without thinking of intermediate steps, trying to pick out a word of comprehension.

The Deductive Method of Thought

When the acquired experience has shortcomings, and the memory is rebellious, or habits forgotten; if the situation is complicated, or where it is necessary to acquire new ideas; to understand a question which one meets for the first time; or finally, if one desires to review a study already made for the purpose of bringing back experience and exercising it, then one proceeds according to the discursive method of thought which moves step by step groping with a "voluntary adhesiveness." Instead of having the spontaneous association of ideas spouting instantly from acquired mechanisms, one relies on characteristic associations of two methods of thought and based in the one case on reasoning from the general to the particular, and the other on the relationship between words.

We are able to proceed in the first case like successive postal employees who sort a letter and put it on the road towards its destination. The first station groups masses of correspondence which are to take a certain direction during transport; a second employee along the way resorts them according to those offices where mail is taken off; after the third sorting, the letter is on its road to the distributing office and a postman takes it from there to the address of the destinee. It is similarly that the course of our thought operates: from country it passes to department (state), then to the borough, to the community, to the street, to the house; or again, starting from the study of the automobile, it isolates mentally the motor, then again the carburetor, in order to localize finally its scrutiny of the jet.

Ideas are derived one from another logically; the first general idea contains all the others, and in particular, some idea which is a fraction of the first. This second idea is itself composed of tertiary ideas, and each of the tertiary ideas divides itself anew into ideas of which the extension is very weak. It is this form of deductive association of ideas for which the tool we use is a systematic classification of ideas for successive bracketing. At each level we review the ensemble in groups of more and more numerous items, the content of each of which is more restricted. Our thought is thus somewhat like an espalier.

This mode of thought escapes from the natural processes of change of degree of magnification, for it requires passing through each of the logical intermediate levels whereas in reality one jumps from concept of vehicle to taxi without even having the thought that between

these two categories one might interpolate intermediate generic types which are less and less extensive.

It also escapes from the work of synthesis, for it concentrates on one characteristic more than another, as all points of view are simultaneously evoked by our thought. The classifications which it uses are of a type similar to railroad systems; one travels there from station to station and at each station new bifurcations diverge toward infinity. Similarly, for facilitating notation, certain classifiers restrict themselves to the grouping within each bracket the same number of elements, which they call the base. This is again a supplementary artifice in such systems which thus miss the full spontaneousness of the thought.

In the second process, we operate like the locksmith whom we seek when we carelessly leave our house, leaving the key in its keyhold on the inside. The workman arrives with a full kit of tools. He looks at the shape of the lock and looks through his assortment of blanks. He tries several and finally discovers one which will open the door.

This is the way we operate when we see a person who appears at first to be unknown but whose face arouses in us a confused memory; we begin to soliloquize: "Do I know that face? Where have I met it? When? ... Ah, it was at Nice, last year. What the devil is his name? ... His name beings with T. No, with D... It's a name like Detail... But it cannot be Detail... Detable, yes that's more like it... Good morning, Mr. Detable. Do you remember me?"

Each of us has experienced this unhappy research through the mechanism of our memory which forces us to retrace successive steps of impressions to "fish up" the entire chain, at the end of which there is a solution to the problem sought, already impressed at some earlier time and which appears to be lost but which may be brought back.

When we employ an alphabetic method, our mind moves along grasping concepts in a similar manner. We approach the subject that we wish to penetrate with a trousseau of words; we search among the remainder of useful words with less facility than the locksmith chooses his keys, for they are simultaneously under his eyes, whereas for us the words are dispersed in our memory or in the list of categories of classification; we try to compare words with our known concepts which we have at our disposal, and we must judge if those which are cataloged under certain words will serve to adapt themselves to the problem which we are handling. It is thus that we utilize a dictionary or lists classified in the alphabetical order of titles. Our view of similar things then is that only of the microscope using the objective with the greatest degree of magnification.

Complexity and Flexibility.

The dynamic action of thought is very flexible, we are able to pass simultaneously from a synthetic general thought to a specific study in our vocabulary to bring back an idea in detail using a deductive method. At one time we let our mind vagabond through generalities, another time we concentrate on the subject of study and observation.

As one grows to adulthood, he acquires a richness of experience and a flexibility of mind and never ceases to acquire additional intellectual enrichment. This is what creates a "state of culture." A modern classification system is capable of being of very powerful service to all those who attempt to attain this state and to maintain it.

In conclusion, the considerations which we have discussed dictate certain conditions which must be fulfilled by classification in order to make it best able to serve this function.

A modern classification must be:

a. Flexible to lend itself to individual synthesis.
b. Evolutionary in order to follow the development of ideas.
c. Explicit and detailed in order to be useful to the greatest number of people.
d. With a number of degrees of specialization, to permit "changes of order of magnification."

The system should be supported by an alphabetical index in order that one may start with a word and locate an ensemble of related general ideas. Its acceptability and its audience will depend on its clarity, its simplicity, and its exhaustiveness.

BIOGRAPHICAL NOTE

M. Henri Clavier was born May 2, 1900, at Brest. He entered the Ecole Navale in 1919,

and served in the navy, first as a line officer and then as paymaster, until 1943. He is now a pay director in the naval reserve, and since 1943 has held a number of industrial positions.

His publications include:

Books:

Grille et Profil Encyclopediques — Hermann et cie; 1942.
le Travail Intellectuel en Synthese (in preparation).

Articles:

Le Classement de la Documentation. L'Organisation Juin 1935, 265.
La Classification des Techniques. Le Genie Civil 1936; ler Sem. P 11.
les Branches du Savior. Mercure de France 15 mars 1938 p. 517.
Quelques Considerations sur le Mechanisme de la Pensee. Review of Documentation (F.I.D.) Vol. 15, No. 2, p. 36.
Premier Clivage. Bulletin de l'U.F.O.D. 1955.

He is now the head of an organization called "Savoir de Tout un Peu," which publishes a bulletin entitled *Specialities et Synthese*. For each "Specialite" examined, the reader receives in the bulletin a basic text with general description and the fundamental ideas involved. These are followed by a vocabulary, a bibliography, and any appropriate practical tables. (For example, in meteorology, there are tables of concordance of the various systems of units).

*A PROGRAM FOR ENRICHING AMERICAN LIBRARY RESOURCES**

*LESTER K. BORN***

What is the meaning of the words "A Program for Enriching American Library Resources," the title of this paper — and Round Table — as given in the program? I am not certain that I know. Does it refer to what has been done? Does it refer to what is now being done? Or does it refer to what should be done? Or, perhaps, does it refer to the ways and means by which one may hope to accomplish what should be done? Although nothing in the title indicates it, I have assumed — from the nature of the sponsoring body and from the position title of the person asked to prepare this keynoting paper — that, whatever the words mean, they are to be interpreted as limited to microreproduction.

This is not the place in which to debate the definition of a library and therby to establish the limits of the word "resources." As our legal colleagues might say, we may stipulate all that.[1] I would like, however, to quote from the *Encyclopedia of the Social Sciences* on the responsibilities of libraries.

*Presented at the annual meeting of the American Documentation Institute, Cleveland, Ohio, Nov. 1954.

**Coordinator of Microreproduction Projects Library of Congress

[1]See, for example Emil Gratzl in Milkau, Handbuch der Bibliothekswissenschaft, II: Bibliotheksverwaltung (1933), page 118:

"DasZiel. Die vollkommene Bibliothek müsste alles enthalten, was der menschliche Geist zur Erkenntnis seiner selbst und der uns umgebenden Welt der Erscheinungen, zur Erkennung und Erklärung des Universums, zur Aufhellung der Vergangenheit der Erde und des Menschengeschlechts, zur Beschreibung des gegenwärtigen Zustandes beider, zur Bereicherung des menschlichen Lebens durch Dichtung, Kunst und Religion und zur Ordnung der Beziehungen von Mensch zu Mensch und Volk zu Volk geleistet hat, soweit diese Erkenntnis im geschriebenen oder sonst vervielfältigten Wort (und Bild) niedergelegt ist und in immer weiterem Umfang niedergelegt wird."

"Any evaluation of the custodial function of the library must take into account the many fields of scholarship affecting social processes indirectly through the mediation of students who work with out-of-print books.... But the fact should be emphasized that the social importance of the custodial library function is not defined by the number of such students in each field."[2]

I believe it is a legitimate extension of the author's thesis to understand with "out-of-print books" also "unpublished" materials.

Auxiliary media — that is, non-originals — in acquisitions programs need no defence. The story of the transcripts has been told by Professor Andrews some years ago,[3] and that of the photostat,[4] which replaced them, is equally honored by age. The advent of microfilm, the currently favored medium for reproduction in a small number of copies, is more or less coeval with the action of the Social Science Research Council in 1929 (Which, incidentally, led to the establishment with the American Council of Learned Societies of the Joint Committee on Materials for Research that sponsored the *Manual on Methods of Reproducing Research Materials* by Robert C. Binkley (1936)) toward "initiating and participating in plans to discover, select, edit, publish, *or otherwise reproduce basic data* in the social sciences, which are difficult of access to students or likely to perish."[5] Microreproduction on an opaque base — "Microcard," "Microprint," "Microlex," — came later.

The record of what has been done is, to a great extent, reflected in the *Union List of Microfilms* (1951-53), but the data assembled there must be supplemented for the earlier materials by the *Reproductions of Manuscripts and Rare Printed Books* issued from time to time by the Modern Language Association (whose collection of rotographs was started in 1923) and by such titles as *A Guide to Manuscripts relating to American History in British Repositories reproduced for the Division of Manuscripts of the Library of Congress;* for more recent materials by such aids as *Checklist of Archives in the Japanese Ministry of Foreign Affairs ... Microfilmed for the Library of Congress, 1949-1951;* for contemporary operations by such titles as *Newspapers on Microfilm,* the University Microfilms' *American Periodical Series,* and the catalogs of the Microcard Foundation and of the Readex Microprint Corporation. Big projects currently incomplete, such as that of the University of California to microfilm materials in the archives of the German Foreign Office (now located in London), are only imperfectly known through brief notices. The foreign phase of the genealogical collection of the Church of Jesus Christ of the Latter Day Saints (Mormons) is well known, but the extensive domestic copying seems to have been less well publicized.[6]

In 1949, at the request of the Association of Research Libraries the Library of Congress established in the Union Catalog Division a Microfilming Clearing House with the object of centralizing data on microfilming projects embracing newspapers, serials, and manuscripts (or archival) collections that were planned, in progress, or completed.[7] In practice, the scheme has worked out somewhat otherwise. The file of data on newspapers is extensive and serves as the basis for new editions of the printed list. Data on serials was transferred

[2]Douglas Waples, s.v. Public Libraries, 11: 664 (1937).

[3]Charles M. Andrews, "The Story of the Transcripts," in Essays Offered to Herbert Putnam ... 5 April 1929, pages 47-56.

[4]James B. Wilbur, "The Photostat," ibid., pages 520-527. Not without significance to present-day planners is the remark on page 523: "There was a slight resistance at first on the part of the curator who felt he wished his unique original to be the lodestone which would bring all who were interested to his institution."

[5]Binkley, op.cit., iii. The italics are mine. The Encyclopedia Britannica, s.v. Library Architecture (1951 imprint, vol. 14, p. 27) reports "At the Library Congress held in 1937 at the Paris Exposition, the use of miniature photographs to reduce storage space was discussed."

[6]Archibald F. Bennett, "The Record Copying Program of the Utah Genealogical Society," American Archivist 16:227-232 (1953).

[7]The Microfilming Clearing House Bulletin, which has appeared 42 times since March 1951, has been able to publish little on non-domestic activities and almost nothing on plans.

to the Philadelphia Bibliographic Center several years ago, and almost nothing on serials is now available in Washington. There is nothing — the card file fills no more than one-half tray after five years — on non-printed materials because the data have not been reported. In other words, the Microfilming Clearing House cannot provide from its files the information necessary to prevent expensive duplication of effort (with resultant bad public relations) in copying programs carried on in foreign archives and libraries.

In the case of newspapers, the Microfilming Clearing House data show that the more important microfilm collections are located in about two-thirds of the states, and are distributed between extremes north and south, east and west. These data also show that five commerical firms — located in Michigan, New York, Ohio, Texas, and Utah — hold extensive groups of negatives, that publishers in 27 states are microfilming their newspapers on a current basis and that the geographical distribution of this work is nationwide. The planning for future extensive microfilm programs, or isolated projects, concerned with domestic newspapers is provided for by the *Selected List of United States Newspapers Recommended for Preservation by the ALA Committee on Cooperative Microfilm Projects*, and the ARL Committee on Cooperative Access to Microfilms of Current Foreign Newspapers is putting into final form a program which will make available on film about 100 foreign newspapers now being published throughout all geographic areas of the world. As the basis for discussion leading to this program the Library of Congress had prepared an evaluated list of some 1200 current newspapers prefaced with an enumeration of the criteria requisite to final selection.

In the case of serials, large numbers of negatives are held by a small number of institutions with special interests; for example, labor publications at Wisconsin Historical Society, foreign periodicals at New York Public Library and Brown University, Mexican official gazettes at the Library of Congress, Catholic periodicals (mostly domestic) at Catholic University. University Microfilms, Inc. has an extensive collection of negatives of current periodicals from which positives may be purchased only by those who subscribe to the paper edition. The same company likewise has microfilmed American periodicals published between 1800 and 1850. Planning for the preservation of domestic periodicals issued in the period 1850-1925 has just been undertaken by the ALA Committee on Cooperative Microfilm Projects in liaison with the Serials Round Table of the same organization.[8]

In the case of manuscripts-archives, I already have mentioned a number of the outstanding projects, but I should add reference to domestic projects such as that of the Adams Trust to make available microfilm copies of the Adams papers in its care, those of Indiana University — Indiana Historical Society (local materials), University of Chicago (Middle American cultural anthropology), and the National Archives (selected series of American Archives),[9] and likewise to foreign projects such as the ACLS British Manuscripts Project (1941-1946) and that of the Library of Congress to copy selected materials in the archives of Mexico. Reference also should be made to the resolution (introduced at the instance of the Institute of American Genealogy) that probably will be presented to the Congress at its next session to establish a commission to develop ways and means of copying passenger lists (and allied documents) of vessels sailing from foreign ports to North America from the time of the first settlements to the

[8]Book acquisition in microform is not one of the categories reportable to the Microfilming Clearing House. Probably the outstanding examples of extensive microfilming projects are the University Microfilms' reproductions of all titles in Pollard and Redgrave, A Short Title Catalog of Books ... 1475-1640; and the plan of the Armed Forces Medical Library to acquire on microfilm, so far as the budget permits, all genuinely medical literature of the fifteenth and sixteenth centuries not otherwise readily obtainable, together with rigidly selected materials from later centuries. See William J. Wilson, "A Plan for a Comprehensive Medico-Historical Library: Scope and Coverage," Library Quarterly 21:248-266 (1951). The examples of microreproductions on a paper base are more numerous; two will suffice as illustrations: the Readex Microprint Corporation's British House of Commons Sessional Papers, 1801-1900, and the Microcard Foundation's The "Rolls Series:" The Chronicles and Memorials of Great Britain and Ireland during the Middle Ages.

[9]List of National Archives Microfilm Publications (1953). The introduction to this list of 4,666 rolls of film explains the nature of the project and indicates future expansion.

establishment of the United States Immigration Service.[10]

Whither has this recital of accomplishments and hopes led us — for it would be pointless at this Round Table if it did not lead toward our objective — in relation to the specific problem with which we are confronted? It has shown clearly that the domestic situation is moderately well in hand with respect to domestic newspapers and serials, that something is being done with domestic records and personal papers, that out-of-print books (usually foreign imprints) are being made available in an organized manner, but that, in general, the foreign phase of nationwide microfilming operations is chaotic in its absence of cooperative organization. Our objective, then, which has been established by the recital of facts, emerges as A NATIONAL PLAN FOR EXTENSIVE MICROFILM OPERATIONS.

If those present will pardon the introduction of the personal into this discourse, I should like to point out that it is exactly four and one half years since I wrote in the opening paragraph of my first paper concerned with this problem that "it is, however, apparently the unfortunate truth that there exists no genuine planning on a national scale with respect to the opportunities afforded by the use of microfilm, and with respect to the responsibilities imposed by the availability of microfilming techniques."[11] In spite of the evolution and, in some instances, implementation of important elements in such a plan during the intervening time, there still exists today "no genuine planning on a national scale." Therefore, I believe it is not only excusable but even mandatory to present again the arguments which I then believed cogent and the validity of which, so far as I am aware, no one since has brought into question.[12]

A national plan must be comprehensive in scope, flexible in details, cooperative in nature, long-range in programming, inclusive of foreign and domestic aspects, and practical in execution. Such a plan must start with a statement of objectives; continue with a survey of the situation and an analysis of the facts; conclude with a recommendation; and it must be complemented with a proposal for means of execution.[13] The formulation of a plan probably can best be achieved through the efforts of a committee, a committee small enough to make meetings feasible and discussions fruitful, but large enough to permit representation of varied interests.

Just as there have come into being elements of a general plan, so there are — and, in some instances, long have been — uncoordinated committees some of which have interrelated and, perhaps, overlapping responsibilities. In addition to the committees of the ALA and ARL already mentioned there has been a committee of the Modern Language Association (disbanded in 1953), and there are the committee of the American Historical Association on Documentary Reproduction, the ACLS-SSRC Joint Committee on Slavic Studies, and the Liaison Committee on Microfilming Manuscript Catalogs, sponsored by the American Philological Association, the members of which represent the APA, the AHA, the MLA, the ACLS, the Medieval Academy, and the Library of Congress. There appear to be no committees established by organizations concerned primarily with the Hispanic, African and Asiatic areas (although subcommittees of the AHA committee cover those areas), and no committees concerned primarily with the subjects of law, music, sciences, social sciences, and the fine arts.

The ACLS now lists 25 constituent societies, and others are represented by the SSRC and the NRC. A national committee that was composed solely of representatives of the councils

[10] 83d Congress, 2nd Session, H. J. Res. 498 (April 14, 1954): Joint Resolution for the Preservation for Posterity of the Archives Establishing the Fundamental History of America Made by the Heroic Men and Women who Emigrated from Foreign Lands to Establish the Plantation and Colonies of America.

[11] "A National Plan for Extensive Microfilm Operations," American Documentation 1:66-75 (1950).

[12] One whose anonymity I must preserve commented upon the draft of my first paper, "The recommendations are all appropriate; it is their implementation that will be difficult."

[13] See, in this connection, the Statement of Principles to Guide Large Scale Acquisition and Preservation of Library Materials on Microfilm which was prepared by the ALA Committee on Cooperative Microfilm Projects and which has been published in several places; e.g., in the introduction to the Selected List (1953) mentioned above.

probably would be too small and too far removed from the specialized points of view. Probably no ideal composition for this committee exists, and probably no compromise will satisfy everyone. Nevertheless, so as to bring the general down to the specific, I suggest that the National Committee for Developing a National Plan for Extensive Microfilming Operations might be composed of these twelve elements: a) APA Liaison Committee, b) Society of Biblical Literature and Exegesis, c) American Folklore Society, d) College Art Association, e) American Musicological Society, f) Hispanic Historical Association, g) American Association of Law Libraries, h) Association of Research Libraries, i) ACLS, j) NRC, k) SSRC, and l) ADI.

The Committee, whatever its composition, obviously must decide first upon its objective. In arriving at the statement of its objective, it seems to me, as well as in the subsequent formulation of the master plan, the Committee should give careful thought to the objectives and plans of the several committees already operational and to the objectives implicit in the work of individual institutions. Again, so as to provide for our discussion a specific rather than a general base, I suggest as the objective of the national plan:

> Through the medium of libraries and similar institutions, with minimum expense and duplication of effort and with optimum public relations, to guarantee to specialists and research scholars anywhere in the United States information concerning and, insofar as practicable, free access to essential reference or research materials, manuscript or printed, located in the United States or abroad, which ordinarily would not be available because of physical condition, rarity, geographical location, cost of acquisition, bulk, or uniqueness.

In surveying the situation and in analyzing the facts, the Committee must keep separate its findings on the domestic and on the foreign front. Having delivered this obiter dictum, I shall proceed forthwith to two items which affect domestic and foreign operations alike. The first is the increasing number of microfilms available from publishers of foreign newspapers, and the number of films becoming available at foreign repositories; for example, the decision of the German newspaper publishers association to make and deposit at the Deutsche Bibliothek in Frankfurt a.M. microfilms of every German newspaper, and the vast number of microfilms resulting from the British Museum's newspaper project. The second is the plan which was discussed only on October 20 of this year at the ninth session of the Committee of Cultural Experts in the Council of Europe, and about which I have no further information, for the mutual exchange of microfilm copies of unpublished guides and catalogs located at various national archives.

We have already discussed domestic activity with respect to newspapers, serials, and manuscripts.[14] An analysis of these incomplete data — a debatable procedure, but one necessary to provide the basis for further discussion here — shows only partial adherence to the principle of state and regional responsibility for materials primarily of state and regional interest, only a partial division of labor in specific fields; it reveals, to the surprise of no one, heavily concentrated effort upon newspapers, slight effort to date concerned with periodicals, negligible activity with respect to manuscript materials, and no organized concern with the problem of converting existing library accessions to some microform for any of a variety of reasons such as economy of space, reduction below binding costs, ease of interlibrary loan, preservation.[15]

[14]At this point two little-known reports, both prepared by the Society of American Archivists' Committee on State Archives, should be considered: Report on status microfilming court records in various states (1952?); Survey of microphotography in state agencies (1953?).

[15]I do not overlook such landmarks as Fremont Rider's The Scholar and the Future of the Library. At the Library of Congress the Binding Committee, which met over a period of two years, "agreed at the outset that 'the continuous growth of the Library's collections at an increasing rate of growth makes it imperative that serious consideration be given to the question of keeping materials in some reduced form, and that any policy of microcopying in lieu of binding certain categories of material should be closely integrated with the policy of buying microcopies rather than ink-print copies.' In furtherance of one of its basic objectives, to draft a statement of policy on binding and alternative

The data for foreign activities lead to the inevitable conclusion — again based upon incomplete evidence — that there is no real pattern. The Americana garnered by the Library of Congress clearly are national in interest, and appropriately are at the national library; extensive Hispanica at the Bancroft Library of the University of California are largely regional in interest, but the materials copied by the same institution in the German Foreign Office are not; materials neither national nor regional in nature but belonging to the domain of general scholarship may be found, not illogically, in a variety of places and have arrived at the repository by varying means — for example, the microfilms of manuscripts in St. Catherine's monastery on Mt. Sinai now at the Library of Congress were acquired through expenditure of the Library's own funds whereas the extensive collection of facsimiles of medieval works deposited by the Modern Language Association were paid for by the Association; the Leibniz microfilms being assembled at the University of Pennsylvania result from a grant from the Rockefeller Foundation; Brown University has microfilms of Greek Biblical manuscripts acquired by a member of its faculty and it has an extensive collection of films of the library of the Chilean bibliophile José Toribio Medina; St. Louis University has the great collection of microfilms being made in the Vatican Library through funds provided by the Knights of Columbus. As was pointed out in the *Statement of Principles* to which I already have referred several times, "It is clear ... that any acquisitions program dependent exclusively upon ... chance opportunities will exhaust the financial resources of American libraries on a miscellany of unrelated projects; and it is equally apparent that a world-wide program planned to bring to this country copies of all valuable source material ... would require the expenditure of sums greatly in excess of the resources available to our libraries for such purposes."[16]

Let us now, for the purpose of furthering our discussion, turn to a consideration of the conclusions and recommendations of the as yet non-existent National Committee for the Development of a National Plan for Extensive Microfilming Operations. As an aside, I should like to say that, in my opinion, this Committee should consider not only its functional responsibilities under any plan that might be developed, but as a first task it should give thought to its possible legal status and its potentials as a united representative of custodians and consumers before the foundations. The Committee might recommend:

a. Adoption of the objective stated above.

b. Endorsement of the philosophy and adherence to the principles set forth in the ALA's *Statement of Principles to Guide Large Scale Acquisition and Preservation of Library Materials on Microfilm.*

c. For domestic activities,

1) Endorsement and encouragement of the work already done or being done on domestic newspapers and domestic serials;

2) In geographical areas of low activity stimulation of interest and, if necessary and feasible, financial support;

3) Emphasis upon regional responsibility, greater coordination of effort, better coverage, and attempt to reduce existing duplication and unnecessary multiplication of positive copies;

4) Maximum utilization of microcopies made abroad of foreign newspapers and foreign periodicals now being copied in the United States;

5) Establishment of priorities;

6) Particular attention to conversion of existing library collections to microform.

d. For foreign activities,

means of preservation, the committee enumerated six categories of materials that should be acquired in, kept as, or converted to microform; viz, a) titles which cannot be acquired economically by other means; b) in which the paper is deteriorating; c) for which the cost of microcopying is as cheap as or cheaper than the price of the original; d) for which the precious nature of the original makes it desirable to have a facsimile supplied for regular use; e) from the general classified collections (with exceptions shown, and insofar as the budget permits) that need rebinding; and f) foreign newspapers." Lib. Cong. Quart. Journ. Curr. Acquis. XII: (1954).

[16]Sect. II, par. 3. For examples of some cost estimates, see my paper "International Cooperation to Preserve Historical Source Materials," American Archivist 15:219-230 (1952).

1) Initial concentration upon acquisition of all useful available bibliographical aids;[17]

2) Upon the foundations laid by the subcommittees of the AHA Committee on Documentary Reproduction, and by those who planned the ACLS British Manuscripts Project, development of a list of desiderata proceeding from general to specific;[18]

3) Maximum utilization of microcopies made or to be made by agencies abroad;

4) Development of spheres of interest, including division of responsibilities for areas or disciplines; and attempt to prevent duplication of effort and unnecessary multiplication of positive copies;

5) Establishment of priorities, with special attention to the effect these may have upon foreign institutions;

6) Special attention to liaison, cooperation, and public relations in all dealings with foreign institutions;

7) Development and adherence to a uniform policy with respect to gratuitous copies of films left with the repository owning the original;

8) Attempt to secure, uniformly, the most liberal possible conditions of access to and exploitation of microreproductions;

9) Special attention to "unique opportunities" so that these neither may be lost nor become destructive of the planned program.

e. Consideration of the final product; that is, the type of microreproduction (including format of microfilm) most suited to the purpose.

f. Adequate, planned publicity for all aspects of the program, with special attention to checklists and other aids to the use of acquisitions or conversions.

g. Request to a foundation for a grant over a two-year period adequate to support a small executive office needed to get the plan under way.

h. Establishment of working parties on domestic matters; foreign matters; size, cost, and duration of operations; methods of financing operations.

i. A report, summarizing the projected program in considerable detail, which will become the basis for securing working capital under one or more schemes.

INTERNATIONAL INFORMATION EXCHANGE

*JAMES D. MACK**

It seems appropriate to begin with three propositional statements about information: first, the world is, in one sense, a vast international pool of information; second, both the amount and the variety of information are rapidly expanding and are possibly infinite; third, information is useful only if it exists in the right place at the right time.

All who are familiar with documentation know of the brilliant empirical attempts now in progress to bring us out of the muddle in the organization of information. Documentalists,

[17]The most recent, and unpublished, proposal to list all unprinted catalogs of manuscripts and archives envisioned a five-year program costing a minimum of $450,000. See also Paul O. Kristeller, "Latin Manuscript books before 1600, Part II: a tentative list of unpublished inventories of imperfectly catalogued extant collections," Traditio 9:393-418 (1953).

[18]Examples of specific projects, all cooperative in nature, are a) genealogical materials such as are not included in the Morman projects, b) collections of original folklore archives, c) Americana of predominantly regional interest, d) Biblical and other texts on Mt. Athos, e) miniatures in all western manuscripts, f) great pamphlet collections of western Europe, g) autograph music scores, h) customary law of seacoast countries of Europe.

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having recognized clearly that organization is not enough, have therefore also begun to develop techniques for abstraction and distribution. It would appear, however, that even this is not quite all of the work ahead. Because scientists are no more self-conscious about their patterns of work and thought than are other people, we actually know very little, as a matter of fact, about the research process. It is, however, known that research workers do ask questions of others, and that they often require immediate answers. This is all normal and has given rise to reference service in our libraries. Presumably the reference problem will continue long after the mechanization of data has become an accomplished fact. The system under consideration here is designed to put in their proper place on an international scale the human elements which enter every information exchange transaction.

In general terms the proposal is to explore the potential, the feasibility, and the techniques of a single agency, the International Information Exchange (IIX), which would serve as a clearinghouse for research inquiries. Specifically, IIX would be prepared to receive questions, either specific or as to source, route them to the most likely source of information among libraries, mechanized data centers, or individuals, receive back, and return the answers to the point of origin. The two keys to the system are a knowledge of who knows what, and high-speed transmission in each transaction.

Admittedly the scheme sounds vast. No doubt it could be set in motion in the U. S. on a regional or a national scale, and be permitted to expand in order to assimilate the demand and supply of information abroad. It would appear, however, that the time has come to make an exploration of the many problems which must be solved before the first inquiry is asked and answered.

In the first place, this operation will cost money. Means must be found to determine the demand for such a system in terms of volume. Here we have very little experience to guide us. But it should be noted that IIX possesses characteristics similar in some respects to channels now operating in the fields of international banking and the dissemination of news, even though the inherent quality of economic or social compulsion may be more obvious in these fields than it is in research.

If a careful study of the potential indicates further investigation of the scheme, the following general suggestions must be considered.

1. IIX should be a non-profit organization for which exploration and original promotion will require support from either a philanthropic foundation or a public agency.

2. After inauguration, IIX should be self-sustaining from charges for transactions, or memberships, or both. There would appear to be three types of users of the system:

   a. Non-profit organizations, such as academic institutions or hospitals.
   b. Commerical and industrial firms.
   c. Governments and their agencies.

If there are to be charges for transactions, the position of governmental agencies in the charging schedule must be very carefully examined. Moreover, although such a practice may seem discrimatory, special consideration must be given to the problem of limiting charges to any enterprise located in underdeveloped areas of the world where, incidentally, such a service as IIX might be particularly useful.

3. IIX should deal only through organizations, and not with individuals acting in their own behalf.

With regard to technique two general statements can be made.

1. Practically all transactions should utilize teletype transmission in an effort to reduce the hidden economic waste in research-time and in postal correspondence.

2. In order to reduce to a minimum the effort and cost of providing the service over a wide geographical area the network method of organization and operation should be employed. But, except in cases of emergency, the system should not resort to shotgun searching techniques.

Having thus outlined the general plan, it might be well to present an example of an international transaction which could be taken as typical. Suppose the primary IIX office to be located in the U. S., and that one of, let us say, six secondary offices is located in Melbourne. A question arising on the Woomera Rocket Range might, and probably now would, go directly to the Commonwealth Scientific and Industrial Research Organization. On the other hand, it could go first to Melbourne IIX which, having a choice, should probably send it first to CSIRO, and then, if no answer were forthcoming, resend it to IIX in the U. S. for handling. From that point the question might go either to

a potential source in the U. S. or to one of the other secondary offices abroad. There would seem to be no reason for the answer to return down the ladder rung-by-rung, but this matter had best be worked out empirically.

The foregoing describes briefly the idea of a super-reference desk which does not answer questions specifically, but which undertakes to find out who can.

The problems which will arise in the course of any exploratory study of the idea may be divided between the substantive and the technical. Certain of these in both categories will, of course, be eliminated if the scheme is restricted to the U. S. alone. It is proposed in this article merely to raise the questions without suggesting more than a tentative answer to them.

A. Substantive.

1. How does IIX achieve accuracy in the questions themselves? This is one of the chief difficulties in all reference work. It would appear that in an attempt to be helpful the inquirer often achieves quite the reverse simply because he has not lucidly communicated his real problem. This is so even though he himself may know very precisely what he is after. In any case, reframing a question once it is in the IIX system would be prohibitively expensive. Therefore, screening and editing at the source must be thorough.

2. Should IIX assume responsibility for the accuracy of its answers? Probably no more than libraries now do in their reference services.

3. What would be the effects of linguistic barriers, both with respect to foreign language and technical jargon?

4. What restrictions if any must be placed upon the type of inquiry handled? Presumably questions bearing upon military and diplomatic applications would arise from time to time. Much of this is taken care of by effective security classification, but the "twilight zone" would present difficulty. The same might be said with respect to patent questions. Again, clearly certain inquiries could, by the sheer volume of work required for an answer, amount to an imposition. Whether any restriction on the level of difficulty should be made must be threshed out.

5. Treatment of unanswerable questions?

B. Technical.

1. What might be the proper relationship of such a system as IIX to existing research and bibliographical agencies, public and private, national and international?

2. What would be the best locations for the primary and secondary IIX centers? Telegraph tolls and the amount of research done in a given area would seem to be critical in the determination of geographic distribution.

3. Should the exchange offer round-the-clock service? And how serious is the problem of operation as related to time-zones?

4. What would be the effects of wartime restrictions on the freedom of operation? And what special services could the exchange furnish in a time of national emergency?

5. What would be the proper qualifications, size and organization of the IIX staff; of primary and secondary centers?

6. Internal security? This is a problem that must be faced realistically in terms of the kind of world we live in.

7. Where in the system are the possibilities, and what are the consequences, of the most damaging human error? "Acts of God?"

C. Other problems, chiefly mechanical, include:

1. Teletype and telephone toll schedules?

2. Gains and losses in currency exchange, and the effects of currency restrictions?

3. Methods of billing, paying, and banking?

4. Promotion and publicity?

5. Legal status of IIX?

6. Maintenance of statistics and records?

The solutions to these problems of organization and operation are difficult to say the least. But exploration should be worthwhile if only to discover that it won't work.

CHEMICAL LITERATURE OF SWITZERLAND

*ERWIN AUER**

At first glance Switzerland's share in chemical literature as a whole may appear somewhat small. If, however, the smallness of the country with its 4-1/2 million inhabitants is taken into consideration, not only its output in the field of chemical literature, but still more its creative research and its share in the development and promotion of the chemical industry may be regarded as relatively important. Generally speaking, productivity in scientific literature reflects the research and industrial activity of a country. For, wherever research and industrial production are carried on, there is a tendency to make the results public, either by journals and books, or by patents.

In Switzerland, however, for a long time conditions have been somewhat different, and remain so even today, to a great extent. The actual research work and scientifico-literary activity in Switzerland is much more considerable than can be assumed from its volume of publication. This disproportion may be explained as follows.

For many years there were few Swiss journals for the actual field of chemistry. Research results in Switzerland were usually published in foreign countries, chiefly in German, but also in French and Italian journals, depending on whether the author came from the German-, French- or Italian-speaking part of Switzerland. Fortunately, conditions are very much more favorable today. Towards the end of World War I, and again during and shortly after World War II, Switzerland began to publish more journals of its own which have gained a sound reputation.

The same situation applies to books by Swiss authors. Up to World War II, well-known works by Swiss chemists were practically all published by foreign publishing houses, particularly German publishers. The reason for this is probably due to an earlier inability of Swiss publishers to meet the demands of the authors in various respects. It was the most natural thing for the authors to have their papers published by specialized publishing houses of good reputation, who on their part could guarantee a large distribution. This applied particularly to publishing houses in Germany and Austria.

Naturally enough, the chemical literature of Switzerland is still overshadowed by the literature which has appeared in Germany. Fortunately, though, during World War II and particularly in the post-war years, Swiss research workers have increasingly given preference to publishers in their own country. Though a number of works are still published abroad, this, however, applies less to new publications than to new editions of works which were originally published abroad.

A survey of chemical literature in Switzerland would be incomplete if nothing were said about its foundations, that is to say the training and research centers which are to be found in the universities, technical high schools and chemical industries. The present state of research activity and industrial development in the chemical field in Switzerland must be considered all the more important, as natural conditions were not propitious for its growth. Although Switzerland does not possess most of the important raw materials such as coal, petroleum, and minerals, the chemical industry nevertheless secured a noteworthy position in the world. Its center lies in Basle, the important frontier town on the Rhine, where the 5 largest chemical factories of Switzerland are situated. These factories were nearly all established in the eighteen-sixties. In spite of keen competition from abroad they have not only maintained their position, but have considerably expanded and consolidated, particularly in the last 20 years.

*CIBA, Ltd. Basle, Switzerland. A biographical note on Mr. Auer appears at the end of this article.

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The most important centers of research and training are the seven universities of the country (Basle, Berne, Freiburg, Geneva, Lausanne, Neuchâtel and Zürich), the "Eidgenössische Technische Hochschule" (Federal Institute of Technology) at Zürich, and the Ecole Polytechnique at Lausanne. These universities have always been open to foreigners. Owing to the good reputation of these universities and, especially, of the Federal Institute of Technology, the best teachers have been attracted to them, among others the winners of the Nobel prize for chemistry, Karrer, Reichstein and Ruzicka.

Unlike several other countries, there is in Switzerland no centralized research organization to coordinate research. Mention will be made later of the most important advocate of research, the "Schweizerische Chemische Gesellschaft," and of other societies.

Journals

The first natural science journal in Switzerland was the "Acta Helvetica physico-mathematico-anatomico-botanico-medica," which was published in Basle in 1751, but only appeared until 1777 (with a short resumption of publication in 1787) (1).

In the years 1841-1843 an attempt was made to publish a collection of abstracts known as "Repertorium für organische Chemie" (Löwig, Zürich), which was an annual survey of chemical research results. In 1893 there is said to have appeared at Schaffhausen the "Mitteilungen aus dem Gebiete der pharmazeutischen und chemischen Literatur" (2), also a collection of abstracts. This journal did not last long either and was discontinued in 1894.

Of the existing Swiss journals only those touching the fringes of chemistry, or with mixed contents, go back to the last century or earlier. Among these are "Archives des sciences physiques et naturelles" which appeared in Geneva in 1796 and which still exists under the name "Archives des sciences" and which, together with the following journals, is included in *Chemical Abstracts*.

A journal having a more pharmaceutical tendency and the origin of which goes back to 1848 under various names, is the "Schweizerische Wochenschrift für Chemie und Pharmazie," which is today the organ of the Swiss Association of Apothecaries and appears under the name "Schweizerische Apothekerzeitung." In this connection the well-known "Schweizerische medizinische Wochenschrift" must be mentioned; it has now reached its 84th year. A peculiarity of most of the journals is that they accept contributions in German, French, or Italian and thus reflect our polyglot country.

According to the "List of Periodicals abstracted in 1951" about 90 Swiss periodicals are covered by *Chemical Abstracts*. Considering the size of the country this is an imposing number. However, the contents of only a few of them are purely chemical.

The most important journal is *Helvetica Chimica Acta*. Since its establishment (1918) it has secured a notable place in the chemical literature of the world and in 1949 it held fourth place among all chemical journals as regards the number of abstracts included in *Chemical Abstracts* (3).

It is perhaps of interest to quote the following introduction from the preface of the first volume which clearly states the principles on which this journal was founded and which still guide it today:

"The Swiss Society of Chemistry has decided to create a new chemical periodical which is appearing today (*i.e.*, 1918) for the first time under the title "Helvetica Chimica Acta;" its principal object will be to publish in the form of short notes or complete texts compiled in our national languages (German, French or Italian) work of a purely chemical nature carried out in Switzerland, and that which is done abroad by Swiss chemists; owing to the support it has received from the directors of the principal centers of scientific research in Switzerland, our society hopes in this way to give an overall survey of the chemical activity of our country.

Foreign scientists to whom the society also addresses itself, will also not be long in recognizing that the publication of *Helvetica Chimica Acta* has become a necessity for us: our society, founded 17 years ago, has for a long time needed an official organ belonging to it alone; on the other hand, postal restrictions have been more and more paralyzing the publication and the circulation of numerous chemical papers carried out in Switzerland which, up to the present were generously welcomed by several important periodicals abroad. Scientists in our country who have benefited by this hospitality will retain a feeling of gratitude towards them."

The first number of *Helvetica Chimica Acta* was introduced with contributions from Werner

and Karrer, both future winners of the Nobel prize.

In recent years, in order to keep the volumes from becoming too bulky, the editors have been compelled to require contributions to be more brief and to refer papers which are of greater interest to physicists to the *Helvetica Physica Acta*.

The latter journal was established in 1928 by the Swiss Physical Society and contains scientific papers in the field of physics and physical chemistry.

In addition to those already mentioned, the following journals are important:

The journal *Chimia* is of a purely chemical nature. It is the official organ of the Swiss Association of Chemists and has been published under this title since 1947. It is an improved continuation of the former *Schweizerische Chemiker-Zeitung* (since 1917), which appeared from 1923-1946 jointly with *Technik-Industrie*. It is the aim of *Chimia* to be of use to the chemist in the continuation of his studies. It contains papers which touch particularly on the field of practical chemistry. In addition to original contributions it gives information on congresses, contains abstracts from chemical literature, and publishes a survey of new Swiss chemical patents. A journal having a general-natural-scientific tendency is the *Experientia* (since 1945) which has secured a firm position in natural-scientific literature. It appears under the motto of Paracelsus: "Scientia est experientia." In addition to original papers it contains brief preliminary communications of research work from the entire field of natural sciences. At this juncture the publications of the Naturforschenden Gesellschaft and its sections should be mentioned (Reports on Discussions, annual reports, bulletins and communications).

Of a more *generally technical nature* are the following journals: *Schweizer Archiv für angewandte Wissenschaft und Technik* (since 1935). The journal treats chiefly questions of working materials and their testing.

In *Chemische Rundschau* (since 1948), which appears as a newspaper and is not included in *Chemical Abstracts*, the whole field of chemical technology is reviewed. In addition, economic aspects of the chemical and pharmaceutical industry are considered.

The *Schweizerische technische Zeitschrift* (since 1904 up to 1926: *Schweizerische Techniker Zeitung*) and the *Technische Rundschau* (since 1909) neither of which is included in *Chemical Abstracts*, are directed to general technology but occasionally touch on chemical interests.

Mention should be made of the following in the field of *fibre processing and dyeing:* The *Textil-Rundschau* (since 1946), the organ of the *Schweizerischer Verein der Chemiker-Coloristen.* This journal contains original contributions and short abstracts on the science and technique of the textile and paper industries. The *Fachorgan für Textilveredlung* (since 1946) of the Schweizerische Vereinigung von Färbereifachleuten (SVF) gives similar information, whilst the *Mitteilungen über Textil-Industrie* (since 1894) is more of a technical and economic character.

It is possible to touch only briefly on the various medical, physiological and pharmacological journals which are relatively numerous in Switzerland. The following may be mentioned:

Helvetica Medica Acta (since 1934)
Helvetica Paediatrica Acta (since 1945)
Helvetica Physiologicy et Pharmacologica Acta (since 1943)
Dermatologica (since 1939)
Cardiologia (since 1937)
Internationale Zeitschrift für Vitaminforschung (since 1932)
Praxis (Schweizerische Rundschau für Medizin) (since 1912)
Revue Médicale de la Suisse Romande (since 1880)
Pharmaceutica Acta Helvetiae (since 1926) is a scientific supplement to the *Schweizerische Apotheker-Zeitung* already mentioned. In 1943 the *Schweizerische Zeitschrift für Biochemie* was published, but after the first number it ceased to appear.

The organs published by Swiss industrial firms form a special class of journals. In the pharmaceutical and medical field there are *Annales-Nestlé* (since 1949), the *Literatur-Eildienst 'Roche'* (since 1933), formerly the *CIBA-Zeitschrift* (published partly in foreign languages) which appeared from 1933-1952, and the *CIBA-Symposium* which first appeared in 1953. Each number of the *CIBA-Zeitschrift* was devoted to a definite field and reviewed medicine, pharmacy, and chemistry in particular from the cultural and historical viewpoint. The *CIBA-Symposium* reviews in original

articles new aspects in the field of medicine and pharmaceuticals.

CIBA-Rundschau (CIBA-Review) (since 1936) which should also be mentioned, has undertaken the task of giving information on the various problems having to do with textiles and dyeing, particularly from a cultural and historical point of view.

By way of summary one may say that the journals of Switzerland have been on the upgrade in the last 20 years, and have gained a good place not quantitatively, but qualitatively among the journals of the rest of the world.

Books

The beginnings of chemical book literature in Switzerland go back to the 16th century. From that time date the writings of the famous Swiss scientist, Paracelsus, of which 83 appeared in Basel (4). Paracelsus was a practical chemist in addition to being a doctor, and the first sponsor of iatrochemistry. The first use of the term "chemistry" (in place of "alchemistry") as applied to the curing of diseases has been attributed to him, (5) as well as the introduction of the term "alcohol" for the "quinta essentia vini" (6). In the same century the important work *De re metallica* by Georg Bauer, called Agricola, appeared; it was published in 1557 by Frobenius in Basle. This work can be considered as one of the first textbooks on inorganic chemical technology (7).

Up to the 19th century no more noteworthy books of chemical interest were published in Switzerland. Among the few books published in Switzerland in the last century the *Handbuch der Technologie* by C. H. Bernoulli (Basle 1840) and the textbook *Chemie der organischen Verbindungen* by Löwig (Zürich 1839) may be mentioned.

Subsequently, and up to World War II, numerous books by Swiss chemists were issued by publishing houses abroad. This practice was already pointed out at the beginning of this discussion. These works which had their origin in Switzerland, but were not published in that country, should not be overlooked. The fundamental technological works of Lunge should be recalled here:

Die Schwefelsäurefabrikation
Chemisch-technische Untersuchungsmethoden
Die Industrie des Steinkohlenteers und des Ammoniaks,

Karrer's famous text-book on organic chemistry which is now in its 12th edition, the works on analytical chemistry by F. P. and W. D. Treadwell, the authoritative works by Rupe, Ruggli and Fierz-David in the dyestuff and dyeing field, are a few which should also be mentioned.

The following review includes only books published by Swiss publishers.

There are no fundamental, general chemical books of reference, but there is a book now comprising 7 volumes which has become known all over the world. W. Theilheimer's *Synthetic Methods of Organic Chemistry* is an excellent survey on the advances in organic synthetic methods.

As *manuals* for chemists doing research and practical work, there are the *Tabellen für Chemiker und Physiker* by Lüthi (1948); a book by Linder *Statistische Methoden für Naturwissenschafter, Mediziner und Ingenieure* (1951); and that by Fueter *Das mathematische Werkzeug des Chemikers, Biologen, Statistikers und Soziologen* (3rd edition 1948).

In the field of theoretical and physical chemistry there are two books by Mohler: *Chemische Optik* (2nd edition 1951) and *Elektronentheorie der Chemie* (1946), and one by Nowacki *Fouriersynthese von Kristallen und ihre Anwendung in der Chemie* (1952). The latter is the first comprehensive account of this field in the German language. In addition there is a textbook by Kuhn *Physikalische Chemie* (3rd edition 1947), and a book by Niggli, *Grundlagen der Stereochemie* (1945) which deserve special mention.

In the field of analytical chemistry one finds a whole series of important works:

In his *Prozenttabellen organischer Verbindungen,* (1951) Gysel has presented the analytical chemist with a particularly valuable aid.

Brandenberger in his book *Röntgenographisch-analytische Chemie* (1946) reviews the possibilities and results of investigations with roentgen interferences in chemistry.

Cohen's books are specifically directed to the inorganic analytical field notably his *Rationelle Metallanalyse* (1948), as is also Jakob's *Chemische Analyse der Gesteine und silikatischen Mineralien* (1952).

Just a few books giving information on working materials and their improvement are: *Allgemeine Werkstoffkunde* by Stäger (1947), *Technologie der Leichtmetalle* by Zeerleder (1947),

and *Elektrische Isolierstoffe* by Imhof (2nd edition 1950). Schmid gives a comprehensive idea of the field of plastics in his book; *Ins Innere von Kunststoffen, Kunstharzen und Kautschuken* (2nd edition 1949).

Fierz-David has written a succinct review in the textile field especially for the use of students, in his *Abriss der chemischen Technologie der Textilfasern* (1948).

Finally, Diserens in his excellent overall survey *Die neuesten Fortschritte und Verfahren in der chemischen Technologie der Textilfasern* has created a book which has had a well-deserved, world-wide success. The book, which consists of several volumes, is divided into two parts:

Die neuesten Fortschritte in der Anwendung der Farbstoffe (1949/1951) and *Neue Verfahren in der Technik der chemischen Veredlung der Textilfasern* (1948/1954), provide a comprehensive bibliography and ample references from patent specifications.

Among the great number of books of a biological, physiological, pharmaceutical, medical nature the following may be mentioned:

Karrer and Jucker: *Carotinoide* (1948). This book gives a comprehensive description of the special group of substances of the carotinoids.

Guggenheim: *Die biogenen Amine und ihre Bedeutung für die Physiologie und Pathologie des pflanzlichen und tierischen Stoffwechsels* (4th edition 1951).

Abderhalden R.: *Vitamine, Hormone, Fermente* (4th edition 1953).

Abderhalden E.: *Lehrbuch der physiologischen Chemie* (26th edition 1947).

Rudolph: *Biochemie des Aminosäure-Stoffwechsels* (1950).

Wagner: *Therapeutische Chemie* (1949) is a survey of medicaments for the treatment of infectious diseases.

Needless to say, Switzerland has a pharmacopoeia of its own: *Pharmacopoea Helvetica* (5th edition 1941 and Addendum I, 1948).

Finally, two dictionaries covering this field should be mentioned; they are *Medizinische Terminologie* by R. Abderhalden (1948) and the German-English-French *Medical Dictionary* by Veillon (1950).

The only comprehensive *historical* work has been written by Fierz-David in his *Entwicklungsgeschichte der Chemie* (1945) which is an interesting and valuable review of chemical development since the earliest times. The book is richly illustrated and the problems are seen in their entirety and with a critical eye.

With that I will close my review of the book literature and speak of Swiss patents.

Patents

The total number of Swiss patents which have been issued up to date is roughly 297,000. About 21% of these concern the field of chemistry. Unfortunately, the classification of patents is out-of-date and no longer meets present day requirements;* there are only 129 groups and 424 sub-groups. However, it is intended to revise the classification system shortly, using the German system as a model.

Up to the present Swiss patent applications have not been examined as to novelty, improvement in the art, or inventive merit. Only a few formal requirements have to be fulfilled. Among these is the condition of uniformity, i.e. the claim can only apply to one process which leads to a single unitary end product. The result is that, in addition to the main patent, a whole series of patents have to be taken out each of which claims a process to be protected.

At the present time a complete revision of the patent law is planned (8) which should eliminate these unsatisfactory conditions. It is intended, among other things, to introduce a proper examination of the applications. Whether the revision of the patent law will be realized or not depends on the vote of the Swiss electorate.

Swiss patents are at present valid for a maximum period of 15 years and for processes of pharmaceutical chemistry 10 years. This period of validity is however not fixed, as it is in the U. S., but depends on whether or not the annual tax is paid by the owner.

Depending upon the language of the part of the country from which it comes, a Swiss Patent can be in German, French, or Italian. This fact is proof, too, of the peaceful and egalitarian life of the people of our country. The *Schweizerische Patentliste* which appears semi-monthly is also published in the three languages. The newly issued patents are listed therein according to the class of patent and the name of the

*In this Switzerland is in very good company — Ed.

owner and the title are given. As a general rule, the name of the inventor is not given in a Swiss patent, unless the inventor is also the owner of the patent. Every year a complete index, arranged by owners and classes, is issued.

Bibliography

The literature is classified and evaluated by the indexing departments of various firms which publish their own literature reports for internal purposes. In addition, there is a *Technischer Literaturnachweis* which is accessible to the general public in the library of the Institute of Technology at Zürich and which is provided with a literature card-index arranged according to the Universal Decimal Classification system.

All the literature which is in any way connected with Switzerland (Author, Publisher, Contents) is collected by the Schweizerische Landesbibliothek in Berne and is accessible to everybody.

The *Bibliographische Bulletin der Schweizerischen Landesbibliothek* gives current information on this literature (since 1901): *Das Schweizer Buch* appearing in one volume for booksellers' publications (semi-monthly) and in one volume for publications not for sale by booksellers (every two months). The *Bibliographia scientiae naturalis Helvetica* appears annually (since 1927) and is published by the Schweizerische Landesbibliothek in Berne. In addition, in the *Systematisches Verzeichnis der Schweizerischen oder die Schweiz betreffenden Veröffentlichungen* the literature covering several years is classified according to subject.

In this connection mention may be made of the *Jahresverzeichnis der Schweizerischen Hochschulschriften* which has appeared since 1898 and embraces all dissertations, theses etc. emanating from Swiss universities.

Finally, mention must be made of a further important bibliography, the Swiss Union Catalog, the "Gesamtkatalog" (established 1927) which is maintained at the Schweizerische Landesbibliothek. This catalogue not only records, in card-index form, all the books and journals which are contained in any of the numerous state libraries, but also those which are kept in the libraries of institutes, factories, or administrations.

There is no compulsion to register any literature in the possession of firms. When registering, the libraries undertake to keep their stock of literature as far as possible available for interurban loan. Following the initiative of the "Schweizerische Vereinigung für Dokumentation" the biggest company libraries have joined the "Gesamtkatalog" and the interurban loan scheme, in order to further the exchange of knowledge and the common weal.

REFERENCES

1. Acta Helvetica, physico-mathematico-anatomico-botanico-medica, figuris nonnullis aneis illustrata et in usus publicos exarata. Basilea 1751-1777; Nova acta Helvetica Basilea 1787, ref. in: Bibliographie Nationale Suisse, Fasc. I b, 1896, p. 1/2
2. Bibliographie Nationale Suisse, Fasc. I b, 1896, p. 138
3. Boig and Howerton: Science *115*, 25-31 (1952)
4. Nova acta Paracelsica IV (1947) p. 116
5. P. Walden, Geschichte der Chemie, 1950 (Bonn) p. 29
6. Bugge: Das Buch der grossen Chemiker, 1929 (Berlin) I, p. 97
7. Fierz-David: Entwicklungsgeschichte der Chemie 1945 (Basle) p. 112
8. De Montmollin G.: Das schweizerische Patentgesetz und dessen Revision vom Standpunkt der chemischen Industrie: Chimia *2*, 186-93 (1948)
   Kambli W.: "Die Totalrevision des schweiz. Patentge-gesetzes": Chimia 1953, *7*, 245-48 (1953)

BIBLIOGRAPHY

List of the more important periodicals in circulation in 1954

(o = not included in Chemical Abstracts)

1. *Chemical Research*
   Helvetica Chimica Acta (Schweizerische Chemische Gesellschaft), since 1918, 8 numbers a year; Basle.
2. *Natural sciences in general*
   Archives des sciences (Société de physique et d'histoire naturelle de Genève), since 1796, bi-monthly; Geneva.
   Experientia (Monthly Journal of Pure and Applied Science), since 1945; Basle.

3. *Industrial Chemistry*

Chemische Rundschau (Organ für Fabrikation, Technik, Forschung, Handel, Import, Export der chemischen und pharmazeutischen Erzeugnisse und deren verwandten Gebiete), since 1948, semi-monthly; Solothurn.

Chimia (Schweizerischer Chemiker-Verband), since 1947, monthly; Aarau.

4. *Technology in general*

Schweizer Archiv für angewandte Wissenschaft und Technik (Schweizerischer Verband für die Materialprüfungen der Technik), since 1933, monthly; Solothurn.

Schweizerische Technische Zeitschrift (Schweizerischer Technischer Verband), since 1904, weekly; Berne.

Technische Rundschau (und allgemeine Industrie- und Handels-Zeitung), since 1909, weekly; Berne.

5. *Physics, Physical Chemistry*

Helvetica Physica Acta (Societatis Physicae Helveticae commentaria publica), since 1928, 6-9 numbers a year; Basle.

6. *Pharmaceutics, Physiology, Medicine and Related Fields*

Annales Paediatrici (International Review of Pediatrics) (since 1857: Jahrbuch der Kinderheilkunde), 2 6-number volumes a year; Basle.

Ars Medici since 1911, monthly; Liestal.

Bulletin der Schweizerischen Akademie der Medizinischen Wissenschaften since 1944, 6 numbers a year; Basle.

Cardiologia (International Archives of Cardiology), since 1937, 6 numbers a year; Basle.

Dermatologica (International Journal of Dermatology), cont. of "Dermatologische Zeitschrift" 1893-1938; 2 6-number volumes a year; Basle.

Internationale Zeitschrift für Vitaminforschung since 1932, 1-2 4-number volumes a year; Berne.

Helvetica Medica Acta (Schweiz. Gesellschaft für Innere Medizin), since 1934, 6 numbers a year; Basle.

Helvetica Paediatrica Acta since 1945, 6 numbers a year; Basle.

Helvetica Physiologica et Pharmacologica Acta (Schweizerischer Verein der Physiologen und Pharmakologen, since 1943, 4 numbers a year; Basle.

Pharmaceutica Acta Helvetiae (Schweizerischer Apothekerverein: Wissenschaftliche Beilage zur Schweizerischen Apothekerzeitung), since 1926, monthly; Zürich.

Praxis (Schweizer Rundschau für Medizin) since 1912, weekly; Berne.

Revue Medicale de la Suisse Romande since 1880, monthly; Lausanne.

Schweizerische Apothekerzeitung (Schweizerischer Apotheker-Verein), since 1848, weekly; Zürich.

Schweizerische Medizinische Wochenschrift since 1870, weekly; Basle.

Therapeutische Umschau (und medizinische Bibliographie), since 1944, monthly; Berne.

7. *Textile Technology and Dyestuffs*

Fachorgan für Textilveredlung ("Schweizerische Vereinigung von Färbereifachleuten" (SVF)), since 1946, monthly; Basle.

Mitteilungen über Textil-Industrie (Schweizerische Fachschrift für die gesamte Textil-Industrie), since 1894, monthly; Zürich.

Referate-Bulletin der Schweizerischen Vereinigung der Lack- und Farben-Chemiker (irregular); Zürich.

Textil-Rundschau (Schweizerischer Verein der Chemiker-Coloristen), since 1946, monthly; St. Gallen.

8. *Company papers*

Annales-Nestlé since 1949, 4 numbers a year; Nestlé Vevey.

CIBA-Rundschau since 1936, bi-monthly; Basle.

CIBA-Symposium since 1953, 6 numbers a year; Basle.

Literatur-Eildienst "Roche" since 1933, 12-18 numbers a year; Hoffman La Roche, Basle

Die Vitamine (Ergebnisse der neuesten Vitaminforschung) since 1938, 6-12 numbers a year; Hoffman La Roche, Basle.

Zyma-Journal since 1936, irregular, Zyma AG. Nyon.

9. *Bibliographic Periodicals*

Bibliographia scientiae naturalis Helvetica (Bibliographie der Schweizerischen naturwissenschaftlichen und geographischen Literatur), since 1927, annual; Berne.

Bibliographia Medica Helvetica, since 1944, annual; Basle.

Jahresverzeichnis der Schweizerischen Hochschulschriften since 1898, annual; Basle.

Das Schweizer Buch; Bibliographisches Bulletin der Schweiz. Landesbibliothek, Bern, since 1901.

"A" Series: Publications sold by booksellers, semi-monthly.

"B" Series: Publications not sold by booksellers, bi-monthly.

Index covering several years:

Systematisches Verzeichnis der Schweizerischen oder die Schweiz betreffenden Veröffentlichungen: 5: Naturwissenschaften und Mathematik: 1901-20; 1921-30; 1931-40; 1941-47; Berne.

BIBLIOGRAPHY OF THE MORE RECENT BOOKS

Organic Chemistry

Karrer P. und Jucker E. Carotinoide, 1948 (Birkhäuser Basle), 388 pages.

Prijs B. Kartothek der Thiazolverbindungen, 1951 (Karger Basle), 1352 pages in 4 loose-leaf binders.

Staudinger H. Makromolekulare Chemie und Biologie, 1947 (Wepf Basle), 160 pages.

Theilheimer W. Synthetische Methoden der organischen Chemie (Synthetic Methods of organic chemistry), 1st volume 1946 / 7th volume 1953 (Karger Basle).

Inorganic Chemistry

Riesenfeld E. Lehrbuch der anorganischen Chemie, 5th edition, 1950 (Rascher Zürich), 718 pages.

Manuals, Tables

Fueter, R. Das mathematische Werkzeug des Chemikers, Biologen, Statistikers und Soziologen, 3rd edition, 1948 (Orell Füssli Zürich), 308 pages.

Linder A. Statistische Methoden für Naturwissenschafter, Mediziner und Ingenieure, 2nd edition, 1951 (Birkhäuser Basle) 150 pages.

Lüthi M. Tabellen für Chemiker und Physiker, 1948 (Wepf Basle), 231 pages.

Theoretical and Physical Chemistry

Kuhn W. Physikalische Chemie, 3rd edition, 1947 (Wepf Basle), 374 pages.

Mohler H. Chemische Optik, 2nd edition, 1951 (Sauerländer Aarau) 296 pages.
Elektronentheorie der Chemie, 1946 (Sauerländer Aarau), 192 pages.

Niggli P. Grundlagen der Stereochemie, 1945 (Birkhäuser Basle), 283 pages.

Nowacki W. Fouriersynthese von Kristallen und ihre Anwendung in der Chemie, 1952 (Birkhäuser Basle), 248 pages.

Analytical Chemistry

Brandenberger E. Röntgenographisch-analytische Chemie, 1946 (Birkhäuser Basle), 287 pages.

Cohen A. Rationelle Metallanalyse, 1948 (Birkhäuser Basle), 418 pages.

Gysel H. Prozenttabellen organischer Verbindungen, 1951 (Birkhäuser Basle), 662 p.

Hägg G. Die theoretischen Grundlagen der analytischen Chemie, 1950 (Birkhäuser Basle), 200 pages.

Jakob J. Chemische Analyse der Gesteine und silikatischen Mineralien, 1952 (Birkhäuser Basle), 180 pages.

Biochemistry, Pharmaceutics, Chemotherapy, Medicine

Abderhalden E. Lehrbuch der physiologischen Chemie, 26th edition, 1948 (Schwabe Basle), 523 pages.

Abderhalden E. Vitamine und Vitamintherapie, 1948 (Huber Berne), 408 pages.

Abderhalden R. Vitamine, Hormone, Fermente, 4th edition, 1953 (Schwabe Basle), 307 pages.

Abderhalden R. Medizinische Terminologie, 1948 (Schwabe Basle), 640 pages.

Abelin J. Spezielle klinisch-chemische Methoden, 1952 (Huber Berne), 312 pages.

Bernoulli E. und Lehmann H. Uebersicht der gebräuchlichen und neueren Arzneimittal, 7th edition, 1949 (Schwabe Basle), 594 pages.

Bladergroen W. Physikalische Chemie in Medizin und Biologie, 2nd edition, 1949 (Wepf Basle), 675 pages.

Bloch H., Gsell O., Lauger E. Antibiotica et Chemotherapia; Fortschritte, 1st volume, 1954 (Karger Basle), 378 pages.

Buddenbrock W. von Vergleichende Physiologie, 4 volumes, 1950-53 (Birkhäuser Basle).

Guggenheim M. Die biogenen Amine und ihre Bedeutung für die Physiologie und Pathologie des pflanzlichen und tierischen Stoffwechsels, 4th edition, 1951 (Karger Basle), 619 pages.

Haurowitz F. Fortschritte der Biochemie 1938-47, 1948 (Karger Basle), 364 pages.

Ludwig H. Repertorium pharmazeutischer Spezialpräparate, Sera und Impfstoffe, 2nd edition, 1948, 1308 pages; Suppl. I (2nd edition) 1948, 331 pages; Suppl. II 1950, 462 pages, (Beobachter Basle).

Moeller K. Pharmakologie als theoretische Grundlage einer rationellen Pharmakotherapie, 2nd German edition, 1953 (Schwabe Basle), 812 pages.

Mühlbock O., Knaus H., Tscherne E. Die weiblichen Sexual-hormone in der Pharmakotherapie, 1948 (Huber Berne), 300 pages.

Pharmacopoea Helvetica V 1941 (Stämpfli Berne), 1244 p. Suppl. I 1948 (Stämpfli Berne), 179 p.

Rudolph W. Biochemie des Aminosäure-Stoffwechsels, 1950 (Huber Berne), 160 p.

Ruepp G. Therapeutisches Taschenbuch für Aerzte und Studierende, 2nd edition, 1954 (Huber Berne), 656 pages.

Veillon E. Medizinisches Wörterbuch deutsch-englisch-französisch, 1950 (Huber Berne), 1417 pages.

Wagner-Jauregg Th. Therapeutische Chemie (Ein Ueberblick über Arzneimittel zur Behandlung von Infektionskrankheiten) 1949 (Huber Berne), 272 pages.

Textile Chemistry, Dyestuffs, Dyeing

Blom A. V. Grundlagen der Anstrichwissenschaft 1954 (Birkhäuser Basle), 385 pages.

Diserens L. Die neuesten Fortschritte und Verfahren in der chemischen Technologie der Textilfasern
Part I: Die neuesten Fortschritte in Anwendung der Farbstoffe
1st volume: 3rd edition 1951, 936 p.
2nd volume: 2nd edition 1949, 572 p.
3rd volume: 2nd edition 1949, 568 p.
Part II: Neue Verfahren in der Technik der chemischen Veredlung der Textilfasern
1st volume: 1948, 740 pages,
2nd volume: 1953, 928 pages,
3rd volume: probably 1954
(Birkhäuser, Basle).

Fierz-David H. E. Abriss der chemischen Technologie der Textilfasern, 1948 (Birkhäuser Basle), 308 pages.

Working materials

Brandenberger E. Grundriss der allgemeinen Metallkunde, 1952 (Reinhardt Basle), 333 p.

Imhof A. Elektrische Isolierstoffe, 2nd edition, 1950 (Orell Füssli Zürich), 206 pages.

Schmid E. V. Ins Innere von Kunststoffen, Kunstharzen und Kautschuken, 2nd edition, 1949 (Birkhäuser Basle), 206 pages.

Stäger H. Allgemeine Werkstoffkunde, 1947 (Birkhäuser Basle), 424 pages.

Zeerleder A. von Technologie der Leichtmetalle, 1947 (Rascher Zürich), 364 pages.

History, Chemical Economy

Fierz-David H. E. Entwicklungsgeschichte der Chemie, 2nd edition, 1952 (Birkhäuser Basle), 446 pages.

Küng H. Die Anwendung der grundlegenden betriebswirtschaftlichen Erkenntnisse im Rechnungswesen der chemischen Industrie, 1952 (Wepf Basle), 119 p.

Roth H. Die chemische Industrie der Schweiz als Exportindustrie unter besonderer Berücksichtigung der Farbstoffausfuhr zwischen den beiden Weltkriegen. Thesis, 1952, Basle.

BIOGRAPHICAL NOTE ON THE AUTHOR

Erwin Auer was born July 24, 1915 at Murten, Canton of Fribourg, Switzerland. He pursued his studies in the Chemical Section of the Federal Institute of Technology and graduated as a chemical engineer in 1938. He was then put in charge of the Library of said Chemical Section and also became Assistant to Professor Fierz-David under whose guidance he wrote his thesis on the "Hydrolysis and Decomposition of Azo Dyestuffs in Aqueous Alkaline and Acid Solution" which brought him his "Dr.sc. tech." title. Since 1943 he has been on the staff of the section for literature and patents of CIBA LIMITED of Basle, Switzerland.

DICTATING MACHINES AS INDEXING AIDS

*CHARLES L. BERNIER and CECIL C. LANGHAM**

The increase in rate of publication of chemical information over the last decade has been accompanied by the development of new indexing techniques by *Chemical Abstracts*. Among these are the use of dictating machines and a team system of organic indexing and of editing assembled index cards.

During the last ten-year period the number of abstracts and index entries has increased by about 170%. This unprecedented increase in the rate of chemical publication and the growing complexity of chemistry have lead to a corresponding increase in labor involved in all phases of index production.

The present techniques for the indexing of *Chemical Abstracts* by subjects and formulas have evolved steadily through the years. One of the latest steps ahead has been the dictation of index entries by the use of magnetic recorders. About six years ago two magnetic disc recorders were tried in the indexing of subjects. These proved so successful that now *Chemical Abstracts* is using twenty wire recorders and three disc recorders for indexing by dictation. In the earlier years, before magnetic recording, all but organic chemistry was indexed in the following way: The journal or page proof was marked by underlining words or writing in terms which would appear as headings in the finished index. This marking operation was carried out by skilled chemical indexers. The marked pages were given to an index-card maker who typed the designated word or words at the top of a three by five inch card, added a suitable modifying phrase (typed across the middle of the card), and copied the column reference in the lower left corner. The organic indexing was done entirely by writing the card long-hand by highly skilled and trained indexing nomenclature experts. At first the use of wire recorders was not extended to organic indexing. It was felt that the complexity of organic nomenclature was such that time would not be saved by the use of these machines and that mistakes would result. It was subsequently proved, about three years ago, that this was not the case and that wire recorders would contribute effectively to the indexing of organic chemistry. A large part of the success of wire recorders in organic indexing can be attributed to a new system worked out by Dr. Mary Magill of the staff. In this new method, which can be called the team system of organic indexing, the work is divided into two parts. The structural and molecular formulas are drawn and computed from the original articles, where these are available, and recorded on auxiliary work sheets by the first members of the team. These work sheets are turned over to the organic indexers who select the compounds to be indexed from the work sheets and other subjects from the abstracts. The compounds are then named and the subject and formula index entries dictated into wire recorders. Only one team needs to acquire the high degree of nomenclature training necessary for systematic naming.

The success which has accompanied the use of wire recorders and the team system of organic indexing can be attributed, in large measure to the simplification of the operations performed by each member of the indexing team and by the substitution of rapid speech for slower typing and even slower longhand. Another factor in the success is the reduction in the number of operations, simple or complex, which are required of each individual in creating each index entry. The techniques of job simplification have been applied to indexing.

It has been found that the transcription of the dictated indexing can be handled effectively by typists with little or no training in chemistry. Even the transcription of complicated organic

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This paper was originally presented before the Division of Chemical Literature of the American Chemical Society.

names can be done by people possessing little knowledge of chemistry. This is true, apparently, because the number of different kinds of chemical groups in compounds is very limited when compared with the total number of compounds known and because the spelling of the names of these groups is largely phonetic. The use of electric typewriters has been found to speed the transcription.

It has been estimated that dictation can at least double the speed of all but organic indexing. While the gain in speed for the organic indexing is probably not so great, there is good evidence of worthwhile savings, and the typed index cards are more rapidly legible than are the ones written longhand.

The effect of indexing by dictation on the accuracy of the index cards is difficult to measure. However, the accuracy is at least as good as by the older method.

Magnetic recorders have an advantage over other dictating devices because of their immediate erasure feature. The dictation would be slowed considerably if the indexer were required to formulate carefully everything he said before he started dictating. He knows that he can readily correct what he has said so he can often start dictating while formulating his nomenclature and modifications. The accuracy in transcription is increased by this erasure feature because there are but few corrections as a part of the final record. Of course the speed of transcription is greatly increased, too.

Because of nomenclature complications the use of magnetic recorders in the indexing of organic chemistry involves a special technique. The organic indexer dictates the subject card after coining the name or more frequently he dictates as he coins the name because he knows that he has the erasure feature which enables him to correct misspoken syllables. Then he dictates the modification, if there is to be one, followed by the column reference with fraction. The column fraction, designated by a letter, is dictated as "able," "baker," "Charlie," "dog," etc., to prevent confusion in transcription; b, c, d, e, and g sound too much alike for safety in dictation of them. By contrast the indexing of abstracts other than organic is dictated either by marking and then dictating, or by marking simultaneously with dictation. The modification is dictated after the heading term, and the column reference is not dictated because the transcriber has the marked page for reference.

A number of different dictating machines have been tried for indexing. Because of the frequent use of the erasure feature, ease in returning to previous dictation is essential. The latest wire recorders which we use are especially modified for indexing purposes by having all controls on the microphone. There are three buttons on the handle: record, rewind, and listen. The listening is done through the microphone. On the very latest model there is even a locking relay to prevent going from "rewind" to "record" accidentally. The fidelity of reproduction of sound is very important since there is frequently insufficient context to guide the transcriber. This is especially true in organic indexing. Distinctness of consonants is of prime importance and can be obtained by correct emphasis of high frequencies in the dictating machine. Since the machines are left turned on and are in constant use for eight hours a day, they must be rugged. Service contracts have been purchased for all machines to take care of repairs and replacement of parts. If the life of the machine is taken to be but five years, the amortization cost plus service contract comes to about $125.00 per machine per year. The actual life of the machines may well be as much as ten years.

In conclusion, we can say that these machines have contributed significantly to indexing speed and that their use is now an established procedure in the indexing of *Chemical Abstracts*.

SOME NOTES ON LOGICAL PRODUCTS AND ASSOCIATIONS

*MORTIMER TAUBE**

In the paper *Class Definition and Code Construction* (1), which is paper Number *VI* of the series Machine Literature Searching, the authors employ the algebra of classes and its symbols in a manner which is certainly questionable if not actually wrong. Since most of what is said is fairly clear in spite of the unfortunate use of symbols and the algebra of classes, we did not feel it necessary to bring this fact to the attention of the readers of *American Documentation* But once again the dictum attributed to Leibniz, one of the great progenitors of modern symbolic logic, to the effect that a good symbolism accomplishes half the activity of thinking, is proven by this instance of its disregard. For the careless use of symbols in this paper has led to actual substantive error in paper Number *VII* and in the paper by Tyler, Myers and Kuipers, both (2) of which appeared in the January 1955 issue of *American Documentation*.

The passage in Machine Literature Searching, *VI* which contains the basic symbolic awkwardness to which subsequent error is traceable is the following:

> "For convenience in applying class definition to the problems of machine searching, we shall use capital letters to denote the individual characteristics used in defining classes. If X is a characteristic used in defining the class x in Fig. 1, and Z a characteristic used in defining class z, and if the elements of the intersect are all characterized by both X and Z, then the intersect $x \cap z$ is characterized by the logical product
>
> $$X \cdot Z.$$
>
> Similarly, the horizontally shaded region corresponds to the intersect of x and y, symbolized by $x \cap y$. This intersect may be characterized as the logical product $X \cdot Y$, if in the same way as before, all the elements in the intersect are characterized by both X and Y. The cross-hatched area is the intersect of y with $x \cap z$ and may be symbolized as
>
> $$y \cap (x \cap z)$$
>
> and this intersect may be characterized, in the same way as before, by the logical product
>
> $$Y \cdot X \cdot Z$$
>
> which is, obviously, the same as
>
> $$X \cdot Y \cdot Z \quad \text{or} \quad Z \cdot X \cdot Y, \text{ etc.}$$
>
> (In the algebra of classes with which we are concerned, the commutative law prevails)."(3)

The statement included in this passage that ". . . . the intersect $x \cap z$ is characterized by the logical product $X \cdot Z$" doesn't really make sense because the intersect '$x \cap z$' *is* the logical product of the class 'x' and the class 'z.' Further, the symbol "." is usually read as the sign of conjunction between propositions. In another part of the above quoted passage, the statement, "If X is a characteristic used in defining the class x and Z a characteristic used in defining the class z, and if the elements of the intersect are all characterized by both X and Z . . . . . " the second "if" clause is redundant. The elements or members of a class which is the intersect or logical product of two other classes, must by definition be characterized by the characteristics which define the members of the intersecting classes. Actually, classes are properties taken in extension and properties are classes taken in intension. According to Quine (4), "It matters little whether we read '$x \epsilon y$' as 'x is a member of the class y,' or 'x has the property y' . . . . . Classes may be thought of as properties in abstraction from any differences which are not reflected in difference of instances. For

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mathematics certainly [including the algebra of classes] and perhaps for discourse in general there is no need of countenancing properties in any other sense." Apparently this failure to observe, at this point, the logical identity of classes and properties or characteristics leads in the passage from Machine Literature Searching VI to the use of two sets of symbols, "x" for the class x and "X" for the property X. Then, with two sets of symbols for classes and properties, there is generated an apparent need for two sets of relations: "$\cap$" for intersect and "·" for product. As we have noted above, the "$\cap$" is usually considered the symbol for the product of two classes or properties and the "·" is usually considered the sign of conjunction between propositions. The conjunctive relation between propositions is analogous to, but by no means identical with, the relations of product between classes.

Following Quine, "The Class $\hat{z}(z \in x \cdot z \in y)$, which has as members the common members of x and y is called the *logical product* of x and y and designated by the abbreviated symbolism '$x \cap y$'." (5) This definition can be stated symbolically as

$$x \cap y = \text{df } \hat{z}(z \in x \cdot z \in y)$$

In describing further the symbol "$\cap$," Quine says "Like all binary connectives '$\cap$' is to be understood as carrying with it a pair of parentheses ..... In practice, however, the parentheses will be dropped when there is no danger of confusion." (6) Quine, of course, is here referring to his own practice in his book *Mathematical Logic;* but the missing parentheses do occasion confusion in the series of papers by Dr. Perry and his associates and in the paper by Tyler, Kuipers and Myers. Again referring to the passage from Machine Literature Searching VI, we find that the authors write "$y \cap (x \cap z)$" with one set of parentheses whereas the rigorous form would be " $[y \cap (x \cap z)]$." But when they write the logical product "Y · X · Z," they omit all parentheses. Actually, the use of parentheses does not affect the meaning of a series of logic products, e.g., Y · X · Z is identical with Y · (X · Z) and (Y · X) · Z, etc. The theorem which states the associativety of the relation logical product is (z) (y) (x) $(x \cap y) \cap z = x \cap (y \cap z)$ (Quine, Theorem 286, page 181).

This failure to carry through the associativety (and the idempotence) of the product relation leads, in Machine Searching VI, to some unfortuante uses of parentheses, e.g. (A · B · C) (C · B · F) -H. (7) Since the authors have earlier in the paper introduced the symbols "< >" as indicating the requirement that the elements constituting the product be in a certain order, the parenthesis can only be used here to indicate grouping or what both January papers refer to as "association." But even in elementary arithmetic and ordinary algebra we learn that grouping has no effect on the product of a series of elements. The expression [2 x 3 x 4 (5 x 6)] [7 x 8] is exactly equal to the expression - 2 x 3 x 4 x 5 x 6 x 7 x 8. Similarly, in the algebra of classes, the expression (A · B · C) (C · B · F) - H is equal to the expression (A · B · C · F) - H. [In the algebra of classes the idempotence of " · " means that C · C = C and not C^2].

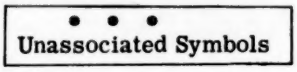
The symbols < > as enclosing a logical product also occasions some dismay. We have previously been told, and quite correctly, that the relations of logical product is commutative, that X · Y · Z is identical with Y · X · Z and Z · Y · X. What then does the " · " symbolize in the expression <A · B> ? If it still means logical product, then <A · B> is a contradiction, because the expression then says that <A · B> is identical with and not identical with <B · A>

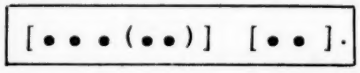
It is when we come to Machine Literature Searching VII and the paper by Tyler, Myers and Kuipers that this misuse of symbols has its most serious consequences. Apparently, the parentheses and brackets are in some way to distinguish between the supposed *mere* juxtaposition or succession of characteristics in some types of coordinate indexing on one hand, and the complex searching possibilities of the type of machine literature searching envisioned by Perry and his associates, and described by Tyler, Myers and Kuipers, as characterizing the Kodak Minicard System on the other. Thus, Machine Literature Searching VII gives the following figure "• • • •" as indicating mere succession and the figure [• • • (• •)] [• •] as indicating "relationships between associated symbols." (8) Machine Literature Searching VII refers to the Minicard paper on this point where it is stated more fully:

> "Up to the present, many searching methods have used index data in a system as unassociated symbols. Some types of 'co-ordinate indexing' are examples of this kind of

approach which corresponds to Case I shown in Figure 10. Index information, when transformed from ordinary language to the symbols in a system of this type, can convey only a certain percentage of the information content. In Case II also shown in Figure 10, some elementary syntax has been added. Boundaries may specify that certain symbols are associated. With these boundaries, it is often possible to convey more of the information content of the index data than is possible in Case I. The Minicard System's capability corresponds to what has been indicated in Case II." (9)

The "Figure 10" referred to above represents Case I as



and Case II as 

The fact is that succession and juxtaposition are spatial and not logical relations and are meaningless when applied to any indexing operation. When we write out "• • •" we are writing an elliptical expression either for the sum or the product of the elements, most often, the product. In ordinary algebra A B is read or understood as A x B. And as a product "• • •" can be written (• •) •, or [• (• •)] without in any way affecting its meaning. Similarly, the expression [• • • (• •)] [• •] is identical in any logical or meaningful sense with the expression "• • • • • • • ".

It would be regrettable if this poor symbolism and worse logic should prejudice anyone against the Kodak Minicard System or the general possibility of machine literature searching. These remain as solid promises of the future even though they are limited, as we all must be, by the requirements of a rigorous logic.

REFERENCES

1. Perry, J. W., Berry, M. M., and Kent, Allen. *Machine Literature Searching VI. Class Definition and Code Construction.* "American Documentation," Vol. 5, No. 4, October 1954, pp. 238-244. Referred to hereafter as Machine Literature Searching VI.

2. Luehrs, F. V. Jr., Kent, Allen, Perry, J. W., and Berry, M. M., *Machine Literature Searching VII. Machine Functions and Organization of Semantic Units.* "American Documentation," V. 6, No. 1, January 1955, pp. 33-39. Referred to hereafter as Machine Literature Searching VII.

   Tyler, A. W., Myers, W. L., and Kuipers, J. W. *The Application Of The Kodak Minicard System To Problems Of Documentation.* Ibid, pp. 18-30.

3. Machine Literature Searching VI, p. 239.

4. Quine, W. V. *Mathematical Logic,* Cambridge Harvard University Press, 1951, pp. 120-121.

5. Ibid, p. 179.

6. Ibid, p. 180.

7. Machine Literature Searching VI, p. 242.

8. Machine Literature Searching VII, p. 33, 34.

9. Tyler, Myers and Kuipers. Op. Cit. pp. 29-30.

REPLY:

Insofar as substantive matters are concerned, Dr. Taube's comments constitute, to a surprising degree, much ado about a typographical error which may have puzzled other readers of *American Documentation.*

With regard to Dr. Taube's comments in general, we observe that wide areas of disagreement still exist. There are hopeful signs that eventually these areas of disagreement may be reduced rather than accentuated. His increasingly positive evaluation of the potentialities of machine-searching methods is especially encouraging.

Under the circumstances, we believe that a minute examination of existing differences of opinion would not be of sufficient value to readers of *American Documentation* to justify the time and effort it would require. However, we shall continue to present, as clearly as possible, the results of our own thinking and research. We trust that Dr. Taube will do likewise, and that differences of opinion may stimulate more effective thinking rather than polemical wrangling.

J. W. Perry
Madeline M. Berry
Allen Kent

ERRATA:

Several errors have crept into formulas in two papers in the series entitled "Machine Literature Searching." In paper VI, *American Documentation*, Vol. 5, No. 4, Page 242, right hand column, the third formula should read:

$$(A.B.C)\ (<C.B.F>) - H$$

In paper VIII, *American Documentation* Vol. 6, No. 2, Page 101, right column the third equation should read:

$$\left[1 - (x/n)_0\right]^K + K(x/n)_0\left[1-(x/n)_0\right]^{K-1} = 1-q$$

and the fourth equation should read:

$$1 - K(x/n)_0 + \frac{K(K-1)}{2}(x/n)_0^2 - - -$$
$$+ K(x/n)_0[1 - (K - 1)\ (x/n)_0$$
$$+ \frac{(K-1)\ (K-2)}{2}(x/n)_0^2 + - - -] = 1 - q$$

In addition to correcting misprints, the last equation has been rewritten to show more clearly the expansion of the second binomial expression.

The authors wish to express regret for any inconvenience these errors may have caused.

MACHINE LITERATURE SEARCHING X. MACHINE LANGUAGE; FACTORS UNDERLYING ITS DESIGN AND DEVELOPMENT

JAMES W. PERRY, ALLEN KENT, and MADELINE M. BERRY

Introduction

A documentation system that employs machine literature searching methods must link together a number of different operations and functions. The more obvious of these are:

1. The analysis of information requirements to express them in terms of operations to be performed by automatic equipment;
2. The analysis and encoding of the subject content of graphic records to render them amenable to machine searching; and
3. The routine operations performed by the machines in accomplishing the desired identification and selection of documents of probable pertinent interest.

This linking together of diverse operations and functions is most conveniently accomplished by a system of symbolism whose design and development is influenced and controlled by a variety of factors to be reviewed in this paper. This system of symbolism has come to be called "machine language." (1) Perhaps the origin of this term could be traced to certain points of similarity and contact with human language. Although misinterpretation of such similarity or overestimation of its importance may have been occasioned in the past by use of the term "machine language," it will be used in this paper as a matter of convenience. At the same time, we shall attempt to place the relationship of machine language to human language in proper perspective.

To emphasize the importance of our subject, we recall to mind that extensive experience has taught the need for care and precision in the use of terminology when constructing conventional subject indexes and classification systems based on hierarchical arrangement of classes and subclasses. (2,3) Awareness of the problems encountered in constructing and using conventional aids to searching may lead to an excessively pessimistic evaluation of the problems that are encountered, if we attempt to depart from tradition and introduce new methods. Since, it is argued, so much human skill is required to generate and to use alphabetized indexes, it will be very difficult to conduct the analysis of the subject content of documents in such a way that brainless machines, by merely performing routine operations, can accomplish useful selection of documents of pertinent

interest to a given problem, question, or situation. (4) Similarly, awareness of problems encountered in establishing and using conventional patent classification systems that are based on pigeon-holing may lead to expressions of doubt as to the applicability of machine searching methods for patents in general, even though applicability in certain specialized fields, such as chemical compositions of matter, may be recognized as offering practical advantages. (5) It is hoped that the present paper may contribute to dispelling these doubts and uncertainties.

We shall undertake to indicate how machine language may be developed so that it links human thinking concerning a given problem or situation with machine operations that can serve to identify and select documents and graphic records that are of probable pertinent interest to the problem or situation in question. We are encouraged in this undertaking by a recent paper that emphasized the emergence of parallel trends of thought in the study of methods of alphabetized indexing, hierarchical classification, colon classification, and subject content analysis for machine searching. (6)

The Nature of Mechanized Searching

The goal of mechanized searching is to achieve hitherto unattainable efficiency in the practical utilization of recorded knowledge in spite of, and also because of, its expanding volume and increasing complexity. This purpose is closely akin to that pursued in the advancement of classification and we may adopt a common statement of purpose by agreeing that, for a given field of interest, "we are attempting to systematize the knowledge of our chosen field in such a way that any individual original item of information can be instantly available, and that any conceivable permutation of individual items of information can be sought for." (7) This statement of purpose may serve as a basis for discerning more clearly the importance of the development of machine language and the fact that such development "bristles with difficulties." To grapple successfully with such difficulties, it is necessary to explore their origin and their nature. Before undertaking this task, it is well to recall to mind certain facts and considerations which, though of pertinent interest to the development of machine language, do not provide needed guidance for carrying through its development.

As has been pointed out in an earlier paper in this series, the identifying and selecting operations that can be performed by properly designed searching equipment involve the matching-up of the characteristic aspects of an information requirement with the corresponding characteristic aspects of the subject content of graphic records. (8) This matching-up may constitute a complex of operations whose relationships must be clearly understood and defined in order that the programming of the searching machine, e.g., by wiring plugboards, may be conducted so as to achieve desired results. The theory of class definition, it was pointed out, provides a convenient means for expressing configurations of characteristics so that they may serve as the basis for programming machines to achieve matching and identifying operations. (9) In this way the theory of class definition may be advantageously applied in assuring successful machine operations. It is important not to overestimate the extent to which the theory of class definition controls machine searching in general and machine language in particular. It is especially important not to overlook the fact that the theory of class definition imposes no limitations on the characteristics that may be selected to designate important aspects of the subject content of graphic records. The only requirement is that the designating characteristics, regardless of their choice or nature, shall be stated in explicit and unambiguous fashion. This requirement is, of itself, insufficient to serve as a complete guide or framework for the development of machine language.

Nor is the needed guidance to be sought in the criteria proposed in an earlier paper for evaluating the operational effectiveness of a machine searching system or of documentation systems in general. (10) Such criteria are to be regarded as the analogs of horsepower, thermal efficiency, boiler water consumption, or similar factors that may be used to rate the performance of a steam engine. Such factors, though undeniably important, do not suffice to provide needed guidance in designing steam engines or machine searching systems. In developing machine language, it is not enough to consider methods for measuring and comparing the relative efficiencies of documentation systems.

There is a fundamental reason why development of machine language cannot be based solely on an analysis of machine operations. This reason is to be sought in the fact that machine language, to be effective, must provide a connecting

link between machine operations and human thinking.

Accordingly, it is necessary that the development of machine language take into consideration various fundamental aspects of the generation and use of human knowledge. In directing attention to such factors, we have limited ourselves to the field of science and technology. Otherwise, various special considerations relating to other fields of learning and professional activity might render our presentation excessively complicated and tortuous. This does not mean, however, that our observations and conclusions are necessarily invalid outside the field of science and technology. Important characteristics of human knowledge can be expected to be independent of the subject-matter field. For this reason, at least, we might anticipate that observations and conclusions made in science and technology may prove valid in other fields such as law or medicine. Additional investigations may be required to establish and demonstrate the extent of such validity in other fields.

Human Limitations and Knowledge

Human limitations constitute the most important factor that determines the character of human knowledge. (11)

Our sensory perceptions inform us, at best, imperfectly concerning the phenomena of nature. For example, electromagnetic radiation, outside a narrow band, cannot be detected at all by direct sensory perception. Our unaided senses leave us blissfully unaware of the babel of messages being transmitted by radio and television. It is easily possible for a person to be subjected to a harmful amount of gamma radiation without noting such exposure.

The invention of various instruments extends the range of perception, but without any assurance that important phenomena are not eluding detection. Fundamentally important phenomena in electromagnetism were discovered less than a century ago. The discovery and detection of nuclear phenomena is still a field of active research. In biology, the mystery of life phenomena has scarcely been penetrated at all.

In spite of these limitations on our powers of observation, we are confronted by a constantly shifting stream of phenomena with which we must cope if we are to survive. At the most primitive level, it is necessary to recognize food objects, though a given specific object may never have been seen before. Similarly, wild beasts and rampaging automobiles must be recognized, and suitable evasive tactics adopted. Without a certain rudimentary ability to recognize that an object never before seen partakes of the character of other similar objects to which attention has been previously directed, it would be impossible for us to survive. It is, in fact, no exaggeration to say that a primitive ability to classify is essential for the survival of men, and also of animals.

In man, however, the ability and the urge to interpret observed phenomena goes much further than the primitive form of classification practiced by animals. Relationships of place, situation and distance are accorded particular attention by primitive peoples. (12) Even limited awareness of such abstract relationships and their expression in language provide a basis for achieving decisive advantages in the struggle for existence. One of the most important of these advantages is the ability to communicate with other persons. By using gestures, sound signals, and spoken language, a basis is provided for group effort, which characterizes the activity of mankind, regardless of degree of civilization, in coping with the forces of nature. Furthermore, it becomes possible to transmit previously acquired information and knowledge between individuals, between groups, and between successive generations. The use of written symbols further facilitates the transmission of information and knowledge across the barriers of time and space. Such symbols, at first usually pictographic in character, tend to become more abstract in nature as civilization evolves. This urge toward precisely defined abstraction leads to the development, in mathematics and related branches of logic, of a type of symbolism for denoting carefully defined abstractions and the relationships between them. The very precision of mathematical formulation renders it unsuitable as a language for expressing many observations and conclusions, particularly those of a qualitative nature. Descriptive language still plays a dominating role in communicating in such important fields as chemistry, biology, and at least certain branches of physics. On account of the limitations of written language and mathematical symbolism, other forms of symbolic expression such as various forms of maps and diagrams are also in

widespread use to communicate various specialized kinds of information.

From this brief review certain basic facts emerge:

1. Limitations inherent in our senses and other means for observation and perception prevent us from discerning and learning everything about any naturally occurring object or event.
2. Perceptual data and observations, if they are to guide our actions in a fashion favorable to our interests, must undergo interpretation.
3. Such interpretation is closely linked with the generation and definition of concepts and the invention of various forms or symbols for communication by speech or by writing.
4. Spoken or written messages are never able to communicate our sensory perceptions in full detail. (It is notoriously difficult, for example, to describe a strange odor or taste. It is difficult to describe different shades of color, and impossible to describe them to a congenitally blind person).
5. Mathematical symbolism is, by comparison with natural language, more abstract, more precise, and less expressive. (In scientific and technical documentation, concepts and relationships are expressed not only by mathematical symbols, but also by words and by other forms of symbolic expression).
6. The incomplete and fragmentary character of any one person's observations, experiences, and abilities makes communication a necessary prerequisite to achieving group action. (This is equally true for a savage tribe engaged in hunting buffalo and for present-day scientists engaged in developing atomic energy).

This situation may, perhaps, be summarized by saying that the ability to conceptualize is essential both to coping with the infinitely varying phenomena of nature and to communicating to achieve success in group activity. Communication is based on various symbols (gestures, speech sounds, writing of various forms) and requires not only transmission of the symbols as such but, to achieve a useful purpose, the interpretation and understanding of the significance of the symbols.

These basic considerations are valid for a much broader range of human activity than present-day science and technology. Within this somewhat restricted field, the experience of many years has resulted in the rather firm establishment of a set of principles which guide the generation and application of concepts. These principles, taken together, constitute the basis of the scientific method. (14) Although the precise formulation of these principles continues to provide philosophers with subject matter for verbal controversy, there can be no doubt that a very wide range of phenomena can be referred to by abstract concepts such as "energy," "force," "atom," "melting point," etc. These concepts and others of like nature have proved extremely useful in analyzing the phenomena of nature, in correlating observations, in communicating the results of observation and correlation, and in predicting and controlling, to an extensive degree at least, the behavior of material objects and processes involving them. Not only are observations — either direct, through our sensory organs, or indirect, through instruments — advantageously interpreted, correlated, and communicated in terms of such concepts, but also the investigation of relationships between concepts has been found to be an advantageous and rewarding undertaking. Thus are constructed those monumental edifices of intellectual achievement known as scientific theory, whose practical utility and power are attested by the very existence of our technological civilization.

In considering what this means in terms of documentation methods, it is well to keep an additional fact in mind: Scientific concepts and theories are not constructed once and for all time to come. Rather, they are like the street system of a large city. They are constructed in the light of present knowledge and practical requirements but with an eye to probable future developments. Nevertheless, new observations — and here we must include more precise measurements, as well as new ideas for achieving correlation — have resulted repeatedly in an older theory being superseded by a more refined and penetrating analysis better able to interpret and correlate a broader range of observations. (15) Thus our ability to predict and to control is extended, perfected, and rendered more efficient. A later section of this paper is devoted to further discussion of documentation and the role of concepts and symbols.

Documentation, Its Purposes and Limitations

From the foregoing, it is perhaps evident that scientific and technical documentation is called upon to serve a number of purposes which are closely inter-related. As a consequence, they are sometimes confused, with consequent misunderstandings as to the nature of documentation methods, their scope, and their limitations.

Let us recall to mind that the basic purpose of documentation methods is to facilitate the efficient use of documents and other graphic materials that are prepared for the purpose of recording, with the aid of appropriate concepts and symbols, those observations that are regarded as sufficiently important to justify the time and effort required for recording them. It is perhaps well to emphasize again that this recording step inevitably involves both a selection of what is to be recorded and also an interpretation on the basis of currently accepted theory and concepts — or, perhaps somewhat more precisely, interpretation on the basis of a given observer's understanding of what theories and concepts are or should be currently accepted.

The general purpose of recording information is to make it available subsequently. In the simplest case, the written or graphic record serves to supplement the memory of the person who prepared the record. Far more frequent and more important is the general case in which information is transmitted to some other person. Under present day circumstances, such transmission of scientific or technical information may result in the receiver applying it advantageously with very little delay. As a consequence, documentation methods have an important newspaper function to fulfill. Here the present-day rapid rate of generation of new scientific and technical information is the source of serious problems. Even the most diligent of specialists have difficulty in reading material directly pertaining to their field of specialization. Abstracts that summarize new work must often be relied upon to provide current awareness which, in the more leisurely times of the not so distant past, was achieved by reading the full length papers. Outside an area of specialization, summary reviews must serve to provide awareness of trends and important developments.

Newly acquired scientific and technical information may not find application until considerable time has passed. As a consequence, it is advantageous to store the records of scientific and technical work for future consultation. The factual character of these two statements is well recognized. Some of their important implications are, unfortunately, often overlooked.

In the first place, a fundamental difference in modus operandi distinguishes communication involving direct transmission of a message from sender to receiver, for example, by telephone, from communication involving use of a file or library of graphic records. Direct transmission of a message may be diagrammed as shown in Figure I, where the means for accomplishing transmission may vary considerably in nature and might be exemplified not only by the telephone but by a letter, the spoken word or by visual images transmitted by television. In a simple transmission, as diagrammed in Figure I, the sender determines what symbols or images are to be transmitted. As long as the transmission is not interrupted the receiver does not determine what will be transmitted, as is sometimes annoyingly apparent when listening to the conversation of boring persons or when viewing television.

The situation is quite different when a file or library of graphic records is used to communicate information. In this form of communication the receiver must play a dynamic role. A collection of graphic records remains inert until the user takes the initiative. This requirement that the receiver take positive action may be diagrammed as shown in Figure II. Until the receiver approaches the record collection, it functions as a reservoir for receiving and accumulating incoming messages.

The number of messages in an extensive file usually precludes personally inspecting all of them each time information is needed. An attempt may be made to use a file by taking items at random, as is sometimes done when browsing. The low probability of turning up material of pertinent interest usually discourages this approach.

The virtual necessity for the user to make purposeful selections when using collections of records means that much time and effort may be conserved by processing such records in anticipation of future use. A consideration of fundamental importance in this connection is the virtual impossibility of foreseeing — in more than a general way — what situations and problems may provide opportunity for advantageous

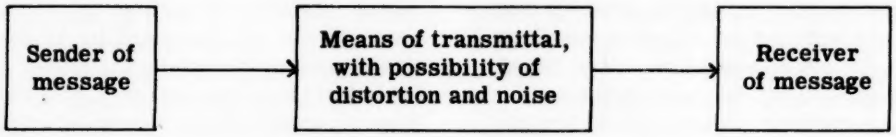


Figure I

Diagram of Direct Communication of Message

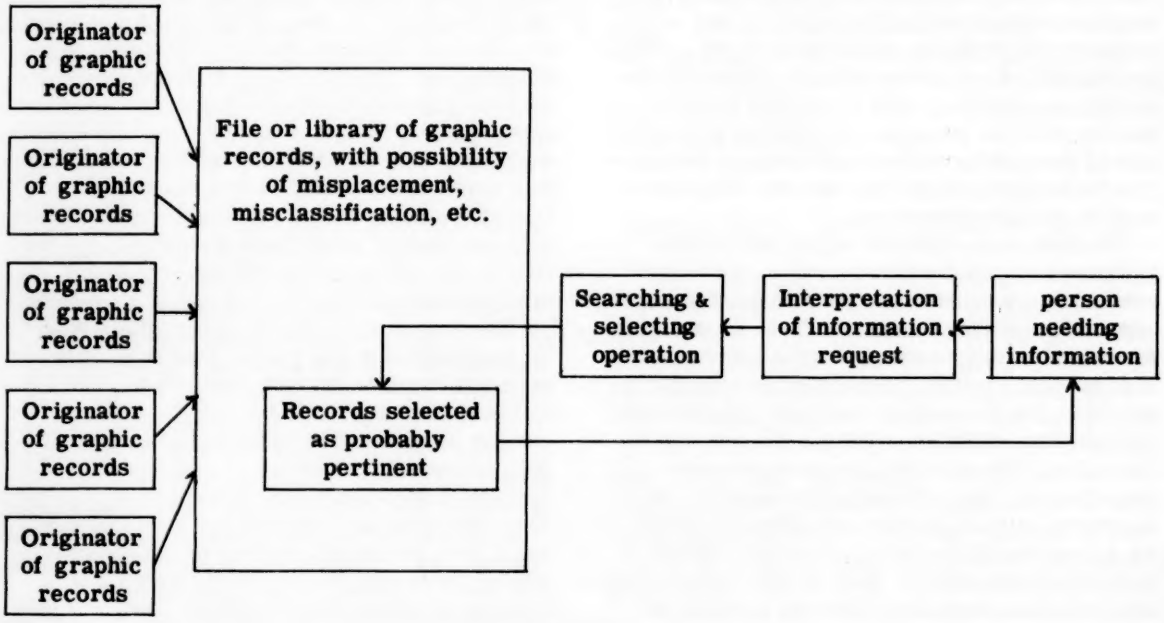


Figure II

Diagram of Communication Through a Collection of Graphic Records

application of the information stored in a given record. Nor is it possible to foresee how various pieces of information may eventually be correlated to meet future situations and new problems. This inability to foresee the future imposes limits on what can be accomplished when indexing, classifying or coding information for future retrieval. It is not possible, in short, to link future uses of information directly to the subject content of graphic records. In this sense, at least, the analysis and processing of information by documentalists can never be as complete as the users of indexes, classification systems and coding might wish.

Documentalists can scarcely do more than provide a multiplicity of useful links (or leads) between the information being processed and the currently accepted framework of scientific and technical theory. The user of a documentation system must interpret his problem in terms of the framework of theory and concepts with which the documentalist has linked up various items of information. (16)

A knowledge of basic theory and concepts must provide, therefore, the basis both for establishing and for using scientific and technical documentation systems. The newer documentation methods, by providing greater flexibility of

selectivity and by accomplishing complex selection operations with the aid of automatic equipment, can facilitate access to recorded knowledge and, in particular, its correlation. No documentation methods conceivable at the present time can, however, relieve the user of the necessity of analyzing his research assignment or similar problem as to what information would be useful or needed. For example, a research problem to extend the useful life of spark plugs by developing better insulators must be interpreted by the research man assigned to the problem with regard to what information is likely to prove helpful. Thus the research man might decide to request papers dealing with the physical and electrical properties of porcelains or he might request information on ceramic materials that are characterized by certain properties.

Furthermore, the user of an information system may find it advantageous to present a series of information requests to a comprehensive documentation system. Thus, information provided in response to an initial request may syggest that another, perhaps somewhat different, information request may turn up additional information useful in solving a given problem. As will be discussed in a subsequent paper on searching strategy, the effectiveness of a documentation system may be considerably enhanced by giving thought to the planning of a series of searching operations. This is particularly true with machine searching systems because of their greater flexibility of selectivity and resultant effectiveness of correlation.

It should also be noted that using a documentation system to satisfy a series of information requests has much in common with carrying through a series of experiments in the laboratory to acquire needed knowledge. With both ways of acquiring knowledge, an answer to one inquiry may suggest a previously unanticipated possible solution or step toward solution. It is perhaps obvious that coordination of library and laboratory research may lead the thoughtful research man first to the library, then to the laboratory, and then back to the library, with the cycle repeated several times during a lengthy or difficult assignment.

Documentation Concepts and Symbolism

As previous discussion has pointed out, we deal with the surrounding material world by taking into account various relationships such as those involving a thing and its attributes, processes and accompanying circumstances, interactions and their results, etc. Human language, in its wide range of variations has provided various sets or frameworks of concepts for observing and expressing those relationships to which attention is directed in dealing with the material world. Different languages may conceptualize various relationships in quite different ways. Thus a concept as fundamental as the past, present or future time of an action or its complete or incomplete nature may be conceptualized in different fashions in different languages. Here we have a parallel with the variations in conceptualization that may and do occur as science develops. The Einstein conception of time as described by relativity theory is quite different from the absolute time on which Newton based both his laws of motion and also their application to describing and predicting planetary and similar motions observed in our solar system.(18)

The task confronting documentalists would be much simpler and easier than it is, if the concepts basic to science, technology, and other fields of learning could be sharply defined once and for all time. The situation with regard to the conceptual framework of science might be compared with the street system in New York City. Repairs and changes are going on continually, yet, during an interval of a number of years, there may be few really important changes in many neighborhoods. Now and then, new conditions — in science this means new observations and new ideas for correlating observations — compel a very considerable change in an old, previously well-established neighborhood. And in the suburbs — in science on the outskirts of knowledge — building is going on at a rapid rate with tentative plans being proposed, many of which are never carried out. Hypothetical proposals for sweeping changes may also be advanced for reorganizing old neighborhoods and, now and then, such rebuilding of street systems and of scientific theory does in fact occur.

It is, of course, not enough for documentalists to cope with those situations in science for which the conceptual framework is well-established and seems unlikely to change. Documentalists must also work with the papers written by pioneers who are exploring new fields of science and developing new branches in technology. The available conceptual tools may leave much to be desired, just as pioneers working experimentally

may be handicapped by lack of laboratory equipment. It is no exaggeration to say that the lack of well-defined and generally accepted concepts may confront documentalists with difficult problems. In this connection some of the principles of information theory may, perhaps, be helpful in guiding our efforts to achieve the best possible results. This possibility will be considered further in a subsequent paper in this series.

Inadequacies, changes and uncertainties as to concepts are not the only source of difficulties for the conscientious documentalist. If we are to work with concepts we must represent them by certain signs or symbols. There is always danger, as Korzybski has so eloquently pointed out of confusing a sign or symbol either with a concept that is represented or with the external reality to which a given concept may be applicable. (19) Meaningful symbols denote concepts and, at best, provide a mapping of concepts. For example, a molecular structural formula of an organic compound as well as the corresponding space model are mappings of the present concept that chemists have of the compound in question. The concept of the structure of a chemical compound is, however, not the substance in question. Similarly the symbol, "e," in a physics text may be used to represent an electron. But this symbol is, obviously, not the concept of an electron, nor is the concept in turn a material object. Rather, the concept is a convenient tool, though a rather sophisticated one, for interpreting, correlating, and predicting the results of experiments and observations.

In working with symbols, the documentalist is, so to speak, twice removed from the outside world which is the source of direct observational experience. Yet it is this world whose prediction and control constitute the goal of science and technology. In contributing his share to achieving this goal, it behooves the documentalist to take heed of the nature of his tools — both conceptual and symbolic. It is, for example, not only naive, but also highly inadvisable, if consistent reliability in retrieval and discrimination is to be achieved, to base a documentation system directly on the words found in reports or similar documents. Documentation cannot hope to rise above a low level of effectiveness if it is based on the words found in documents rather than on an understanding of the latter's subject content. The effectiveness of words and other symbols depends on the care and precision with which they are used. The meaning of words is subject to continuing erosion and change by virtue of more or less gradual shifts in usage. Such uncertainties with regard to words are among the reasons for widespread use of alternate symbolism; e.g., structural formulas in chemistry, wiring diagrams in electrical engineering, special symbols in various branches of mathematics. Such symbolism often has the additional advantage of more concise representation of concepts and relationships than could be achieved by using words. The efficient exploitation of special symbolism is an important factor in the construction of machine language, as will be discussed in subsequent papers in this series.

Approaches to Developing Machine Language

The preceding discussion has been directed to considering the generation and application of knowledge and the closely related purposes that documentation is called upon to serve. Such a review of fundamentals appeared necessary in view of widespread uncertainty as to what is required to develop machine language in an effective form. Such uncertainty may have been responsible for a number of approaches to machine language being proposed. The more important of these proposals might be summarized as follows:

I. *Word Indexing*

The simplest proposal is to designate the subject content of each document to which searching operations are to be directed subsequently by a set of words found in the document itself. This approach leaves out of consideration the flexibility of natural languages in general, and English in particular. As a consequence of such flexibility, it is highly probable and, in fact, virtually certain, that important aspects of subject content will be expressed differently in different documents. Synonyms and near-synonyms are not the only source of difficulty and confusion. Combinations of words may be used in one document to indicate the same aspect of subject content that is denoted by a single word in another document. In the extreme case, which is not necessarily rare, an important aspect may be left implicit in one document, but rendered explicit in others, either by some word or

combinations of words. As a consequence, word indexing, when consistently applied to a large file of complex subject matter, can be expected to lead to a low retrieval factor. As long as ineffectiveness of retrieval is unimportant or disregarded, dissatisfaction with the results provided by word indexing may be avoided.

II. *English as the Machine Language*

It is generally recognized that the complexity of English sentence structure presents extreme difficulties to programming automatic equipment so that important aspects of subject content may be recognized with a high degree of reliability. It is somewhat surprising to observe that many persons have difficulty in foreseeing and avoiding the pitfalls of word indexing, while few, if any, advocate that English or any other natural language should be adopted as a machine language for searching and correlating purposes. Perhaps the explanation is to be sought in the obvious complexities of English phrasing and sentence structure on the one hand, and in a persistent confusion of words as symbols with their meanings on the other hand.

III. *English as a Basis for Machine Language*

As noted already, it is easy to see that English is not suitable for direct use as a machine language. It is sometimes urged that the development of machine language should proceed by conducting a detailed analysis of English in order to arrive at a set of logically consistent modes of expression which would then be the machine language. Also, this proposal would look to the establishment of rules for reducing any English sentence to logically consistent form. Carrying through this program would certainly constitute a major contribution to linguistics. There are, however, reasons for questioning whether this approach would lead to the development of a machine language of optimum effectiveness. It is well known that no universal "natural" logic underlies human languages. (20) Rather, each language is based on certain postulates as to which types of observations and correlations are important. For languages pertaining to the same group, differences in basic postulates may be minor in nature. Thus, in studying sister languages of the Indo-European group such as French, German, or Russian, we do not come into contact with many strange postulates of the kind observed, for example, in the languages of the American Indians. (12,17,20) For this reason, the arbitrary nature of the basic postulates of English is apt to escape our attention, just as an English-speaking person who never learns a foreign language is likely to remain unaware of the arbitrary conventions that are involved in the use of English auxiliary verbs, prepositions, and other connectives. (21)

Attempting to derive by analysis of English a basic machine language would lead, at best, to formulation of the basic postulates underlying our language. The basic theoretical structure of chemistry, physics, or any other branch of science would neither be revealed nor taken into account in such a study of English. To insist that the postulatory structure of English, or any other natural language, be adopted as a basis for constructing a machine language is equivalent to assuming that this postulatory structure is well adapted for recording aspects of meaning in order to provide a basis for machine searching. This seems highly doubtful when we consider the ancient origin and historical evolution of English, on the one hand, and the specialized purposes to be served by machine language, on the other hand. (17,20)

IV. *Boolean Algebra as the Basis of Machine Language*

As previously discussed, the theory of class definition provides a convenient basis for planning and conducting searching operations to be performed by machine. This fact appears sometimes to mislead careless thinkers into assuming that automatic equipment can be used to search messages (e.g., abstracts of scientific papers) only if their contents have been expressed in Boolean algebra or in some other form of symbolic logic. It seems likely that this false conclusion arises from confusing the definition and planning of scanning and searching operations with the content and the organization of the messages to be searched. Actually, any aspect of subject content, that is to say, any concept or relationship between concepts, may serve as a basis for defining and carrying through machine searching and selecting operations provided only that the aspect in question is clearly and unambiguously stated. As we shall see in a subsequent paper devoted to encoded abstracts, a variety of devices can be used to express aspects of subject content in

such a way as to render them available as reference points for planning and conducting searching operations. The basic requirement that aspects of subject content be clearly and unambiguously stated makes obvious the reason why machine scanning and searching operations, defined in terms of the theory of class definition, can scarcely be expected to produce reliable and satisfactory results, if the messages being scanned are expressed in the English language. The wide variation in wording and sentence structure makes it very difficult to predict with acceptable accuracy what words or combinations involving words and other symbols will be used to express and to record various aspects of subject content.

V. *Organized Designation of Subject Content Aspects*

As previous discussion has pointed out, our ability to cope with the ever-changing, infinitely variable phenomena of observable nature is based on our organizing our perceptions and observations in terms of the features, properties, and characteristics that pertain to various observable entities and the processes and changes in which they may be involved. Such organization of perceptions inevitably involves conceptualization; that is, the formulation of concepts or constructs which are not limited to features, characteristics, and properties, but also extend to entities, processes, and relationships between them. Conceptualization provides a framework of reference to which observations may be related so that their significance may be evaluated and decisions as to appropriate action may be made. Expressing, communicating, and recording observations and their evaluations are functions of various systems of signs, of which language has been and still remains the most important in most fields of human activity.

Among primitive peoples it is, perhaps, possible that conceptualization and the related description and evaluation of phenomena may proceed at a single level equally well understood by all who constitute a given community. Uniformity of conceptualization, description, and evaluation of phenomena are impossible in our industrial civilization, based as it is on specialization and diversification of activity. Describing an automobile to a housewife so that she can operate it is an entirely different matter than the description by an automotive engineer of the same performance characteristics. In some fields of learning; e.g., physics; conceptualization has reached the point that words are being superseded to a steadily increasing degree by mathematically defined symbols. Even in those fields in which words still can be used effectively for human communication, we must take care that the concepts they designate are clearly understood. Much of our formal professional education is devoted to imparting an understanding of concepts, just as much of the mental effort of early childhood must be devoted to learning to speak.

Such — in outline form — are the considerations that have led us to base the construction of machine language on the organized designation of subject content aspects. Here the word "aspects" is used in a generic sense in include both the full range of concepts from the most specific to the most generic, and also the different relationships between them. As will be set forth in a subsequent paper, it is convenient to distinguish between two types of relationships. One of these, which we shall term "analytic," pertains to the scope of meaning of concepts and, consequently, to the definition of corresponding terminology. Thus "glucose" is a "sugar" by virtue of definition of these terms. Similarly, "sulfonation" is a "chemical reaction." The other relationship, which we shall call "synthetic," relates to assertions made with the aid of concepts and related terms. An example of such an assertion is "man bites dog." Here the synthetic relationship between "man," "bites," and "dog" is to be carefully distinguished from the analytic relationship between "dog" and "animal."

In carrying through this approach to developing machine language, it is perhaps obvious that we may select, as component units of our machine language, any concepts and relationships that may be appropriate to the purposes to be served. Furthermore, we may establish and define various relationships, both analytic and synthetic, in any way that may be appropriate. Consistency is, of course, of primary importance if machine searching is to be both reliable and efficient. Inconsistencies will lead to uncertainties in machine performance unless we compensate for inconsistencies by special precautions when programming the searching operations to be performed by the automatic equipment.

In working out this approach to machine language, as will be described in a later paper in this series, it is necessary to take certain

practical considerations into account. Some of the more important of these will now be discussed briefly.

Fundamental and Practical Factors

The fundamental factors that underlie the development of machine language relate, as we have seen, to human limitations and knowledge, to documentation, its purposes and limitations, to the role of concepts and symbolism in documentation. It is obviously impossible to treat these important subjects exhaustively within the limits of this paper. We trust, however, that this discussion may contribute, nevertheless, to clarifying uncertainties as to machine searching in general and machine language in particular.

Fundamental considerations determine the grand strategy for the development of machine language. Details of design, on the other hand, must take into account various practical considerations if machine language and machine searching are to provide optimum advantages. These practical factors are controlling not only with respect to costs of establishing and operating machine searching systems but also with respect to their performance and usefulness.

As already noted, machine language must express aspects of subject content so that they may serve as reference points for defining and conducting machine searching operations. More specifically, achievement of advantageous results requires that these reference points be set up in such a fashion that information requests of practical importance, regardless of their scope, can be readily serviced. Furthermore, it is not enough that the machine shall direct attention to all or an acceptably large fraction of the pertinent documents (high recall factor), it is also essential that the person requesting information shall not be overwhelmed with large amounts of non-pertinent material. In other words, the "pertinency factor" must also be kept at an acceptably high level. (10) These considerations mean, in practical terms, that the development of machine language must take into account not only the necessity of recording, in explicit form, aspects of subject content that permit pertinent documents and graphic records to be identified by automatic operations. It is also necessary to take heed of the necessity of achieving rejection of documents and graphic records that are without pertinent interest to the given problem or situation that confronts the inquirer. In meeting this latter requirement, specification of synthetic relationships can prove particularly advantageous. On the other hand, making analytic relationships explicit is particularly advisable in constructing machine language so that it may provide reference points for positive identification of documents and graphic records. It would be misleading, however, to imply that one or the other of these two types of relationships serves exclusively either for identification or rejection in conducting searching and selecting operations.

It is necessary to assess with care the advantages to be achieved by designing machine language so as to make available a wide range of aspects, especially relationships, as reference points for defining and conducting searches that are directed to complex subject matter. It is quite possible to pass the point of diminishing returns by constructing machine language so that many aspects of subject content not useful in conducting searching operations are rendered explicit and recorded in form to be scanned for machine selection. In the extreme case, an excess of zeal may lead to an attempt to state explicitly all factually true aspects and all logically valid relationships. In developing machine language, care must be taken to ensure that a realistic evaluation is made of aspects of subject content that are actually useful in conducting identifying and rejecting operations. Experience indicates that surprisingly simple forms of machine language can meet rather severe requirements.

From what has been said, it is perhaps obvious that simplicity of design of machine language, commensurate with satisfactory selecting and discriminating power, is highly desirable. It may be worth noting that the principal factor that makes simplicity desirable is not the nature of machine operations. If each element of complexity in a machine language is unambiguous and explicit in character, routine operations may be set up so that the machine will not fail in performing its assigned functions. Freedom from ambiguity and clear definition of elements of complexity may be regarded as the demands that the automatic equipment makes on machine language. Highly complex sets of operations are readily performed by modern electronic devices.

The situation, however, involves another

important consideration. Before machine searching becomes operational, the important aspects of the subject content of documents and graphic records must be expressed in machine language. This basic step of interpretation by its very nature must be performed by some person who understands both the subject content of the graphic records and also how to express their important aspects in machine language. This interpretation job can be facilitated and unnecessary costs avoided by taking care that machine language is designed so as to be kept free of complexity that does not pay its way by providing useful discriminating ability.

Another possibility for coping with the cost problems that the task of interpretation presents is to coordinate the interpretation step with other processing so that additional purposes are served. Thus, to consider one possibility, the interpretation of subject content to make it amenable to machine searching can be coordinated with the generation of telegraphic style abstracts that are particularly well adapted to prompt publication of an abstract bulletin to provide up-to-the-minute current awareness of new developments. Prompt reporting is important, not only in science and technology, but also in the fields of law and legislation. A considerable measure of success has already been achieved in combining prompt abstracting with analysis of the subject matter of documents preparatory to machine searching.

The coordination of interpretation for machine searching with the generation of alphabetized subject indexes also may provide important operating economies. Similarly, when conventional classification of documents is advantageous in meeting certain needs, a coordination of processing operations may afford important economies.

Another possibility for serving multiple purposes is to conduct interpretation for machine searching in such a way that the statements of subject contents can also serve as a basis for the automatic equipment to bring these statements into interaction, either with each other, or with data externally supplied. Such interaction might involve computations of an arithmetic nature, or deductive processes based on logical relationships. Information would not only be retrieved and correlated, but would also be processed to produce new conclusions. This important realm of possibilities is outside the realm of machine literature searching and will not be considered in detail in this series.

Concluding Remarks

Our consideration of factors underlying the design of machine language has led us to consider a number of fundamental matters relating to the nature of human knowledge, the formulation of concepts, and their role both in interpreting and in communicating observational and theoretical subject matter. Various theoretical and philosophical problems encountered in the area often give rise to differences in opinion. Nevertheless, it is possible to discern an encouragingly wide area of agreement as to important fundamental principles which, together with various practical considerations, can serve to provide guidance in developing machine language. Our discussion of fundamental and practical factors can scarcely be regarded as exhaustive; yet enough may have been said, perhaps, to indicate the course we believe to be most likely to lead to success in developing machine language.

Is it realistic to feel confident of achieving success? Is it possible to develop machine language and related methodology so that machine searching systems will provide practical advantages? We believe these questions must be answered in the affirmative. Eventually, of course, the doubts of sceptics can be overcome only by large-scale operational success. As with atomic power plants, doubts may fade slowly during several years or more. We are hopeful, however, that various papers in this series, by outlining the construction and application of machine language in relatively simple form, may provide encouragement to the optimists, whose vision of the future is sometimes more realistic than the doubts of sceptics.

References

1. "Mechanized System Launches New Era for Literature Searching," Staff Report, Chemical and Engineering News *30*, 2806-2810 (1952).
2. Bernier, C. L. and Crane, E. J., "Indexing Abstracts," Ind. Eng. Chem. *40*, 725-30 (1948).
3. The importance of care in defining and using terms in constructing classification schemes becomes evident on considering the classification systems of Patent Offices, both American and foreign. Note, in particular, the "Classification Bulletins" of the U. S. Patent Office.

4. Crane, E. J., and Bernier, Charles L., "Indexing and Index-Searching," Chapter 23 in Casey, Robert S. and Perry, J. W., "Punched Cards. Their Applications in Science and Industry," Reinhold Publishing Co., New York, 1951, pp. 331-350.
5. Bush, Vannevar, et al., "Report to the Secretary of Commerce by the Advisory Committee on Applications of Machines to Patent Office Operations," Washington, D. C., December 22, 1954.
6. Vickery, B. C., "Developments in Subject Indexing," J. Documentation, *11*, 1-11 (1955).
7. Dyson, G. Malcolm, "Advances in Classification," J. Documentation, *11*, 12-18 (1955).
8. Luehrs, Fred U., Jr., Kent, Allen, Perry, J. W., and Berry, M. M., "Machine Literature Searching. VII. Machine Functions and Organization of Semantic Units," American Documentation *6*, 33-39 (1955).
9. Perry, J. W., Berry, M. M., and Kent, Allen, "Machine Literature Searching. VI. Class Definition and Code Construction," American Documentation, *5*, 238-44 (1954).
10. Kent, Allen, Berry, M. M., and Perry, J. W., "Machine Literature Searching. VIII. Operational Criteria for Designing Information Retrieval Systems," American Documentation *6*, 93-101 (1955).
11. Ayer, J. A., "Language, Truth and Logic," Victor Gollancz, London, 1948, pp. 33-44, 87-102.
12. Cassirer, Ernst, "The Philosophy of Symbolic Forms, Volume I. Language," Yale University Press, New Haven, 1953, pp. 198-215.
13. Bridgman, P. W., "The Nature of Physical Theory," Princeton University Press, Princeton, 1936, pp. 47-58.
14. Margenau, Henry, "The Nature of Physical Reality," McGraw-Hill Book Co., New York, 1950, pp. 56-101.
15. Bell, E. T., "Mathematics, Queen and Servant of Science," McGraw-Hill Book Co., New York, 1951, pp. 277-287.
16. Soule, Byron A., "Searching the Literature," Chapter 24 in Casey, Robert S., and Perry, J. W., "Punched Cards. Their Applications in Science and Industry," Reinhold Publishing Co., New York, 1951, pp. 353-365.
17. Chase, Stuart, "The Power of Words" Harcourt, Brace, and Co., New York, 1954, pp. 102-109.
18. Reichenbach, Hans, "The Rise of Scientific Philosophy" University of California Press, Berkeley and Los Angeles, 1951, pp. 144-156.
19. Korzybski, Alfred, "Science and Sanity," 3rd edition, The Institute of General Semantics, Lakeville, Conn., 1948, pp. 223-235.
20. Werkmeister, W. H., "A Philosophy of Science," Harper and Brothers, New York, 1940, pp. 108-139. Note especially pp. 137-139.
21. Gode, Alexander, and Blair, Hugh E., "Interlingua Grammer," Storm Publishers, New York, 1951, pp. 50-51.

DEFINITIONS OF DOCUMENTATION

The *ad hoc* committee of the American Documentation Institute selected to judge the results of the competition for a definition of *documentation* have announced the following awards:

"The science of ordered presentation and preservation of the records of knowledge, serving to render their contents available for rapid reference and correlation." Dr. G. Malcolm Dyson, Loughborough, England.

"The *procedure* by which the accumulated store of learning is made available for the further advancement of knowledge." Atherton Seidell.

"The art of facilitating the use of recorded, specialized knowledge through its presentation, reproduction, publication, dissemination, collection, storage, subject analysis, organization, and retrieval." Mrs. Helen L. Brownson, National Science Foundation.

The Committee reports that, though a number of excellent definitions were received it based its choices on the belief that a definition should encompass both theory and practice, emphasize the quadruple aspect of production, organization, retrieval, and dissemination, and suggest the social implications of these activities.

The Committee further reports that it is still of the opinion that the perfect definition of documentation is still to be written.

The *ad hoc* committee was composed of the immediate Past-President of ADI, the President, and the President-Elect, i.e. Milton Lee, Scott Adams, and Joseph Hilsenrath, respectively.

CONFERENCE ON THE PRACTICAL UTILIZATION OF RECORDED KNOWLEDGE AT WESTERN RESERVE UNIVERSITY

As announced in the July issue of *American Documentation* (see pages 162-166) the School of Library Science, and its Center for Documentation and Communication Research, at Western Reserve University, will sponsor on January 16th through 18th, 1956, a conference on "The Practical Utilization of Recorded Knowledge — Present and Future." This conference which is designed to meet the needs of business, government, research management, scientists, lawyers, doctors, librarians, information specialists, educators, equipment manufacturers, and others concerned with the effective management of recorded information will be held at the University Library (I. F. Freiberger Building), and Severance Hall.

Co-sponsors of the Conference are:

American Documentation Institute
American Library Association
American Society for Metals
Case Institute of Technology
Committee on Technical Aids to the Law, American Bar Association
The John Crerar Library
Lehigh University
New Jersey Law Institute
Office of Ordnance Research, U. S. Army
Special Libraries Association

Purpose and Objectives

1. To identify areas of possible cooperation and promote mutual understanding between users and processors of information.
2. To outline possible cooperative programs for organization and distribution of information, with particular attention to abstracting, indexing, analysis for machine searching, and exchange of information in organized form
3. To define the underlying principles of information analysis and correlation and to suggest practical modifications of present information-processing methods in accordance with these principles
4. To devise a curriculum pattern which will prepare information specialists to exploit most effectively those resources which the future will make available.

The proceedings of the Conference will be published and disseminated widely.

Permanent committees will be established, where these seem necessary, for continuation of the cooperative efforts inaugurated by the Conference. Such committees will work in conjunction with various scientific and professional organizations, associations, and institutions in prosecuting the programs of research defined by the Conference.

Registration

Working committees representing more than fifty industrial, educational, institutional, and governmental organizations are preparing seven "state-of-the-art" papers for distribution before the Conference to registered delegates.

These papers, which will form the basis for the Conference deliberations, will be concerned with:

1. Defining the characteristics of recorded information.
2. Describing the research and decision-making processes.
3. Identifying the ways and means in which

research workers, executives, and others use information.

4. Inventorying and providing a basis for evaluation of existing systems for analysis, storage, and retrieval of information.

5. Developing a system of documentation terminology that can be used at the Conference.

6. Surveying the various fields concerned with information organization and identifying "contact points" for the ultimate organization or cooperative programs.

7. Surveying and summarizing the present status of education programs for the training of librarians, documentalists, and information specialists.

In order that these "state-of-the-art" papers may be distributed well in advance of the Conference for study by the delegates, registration should be as soon as possible. The registration fee is $10 (student fee $2.50); checks should be made payable to Western Reserve University and sent to Dean Jesse H. Shera, School of Library Science, Western Reserve University, Cleveland 6, Ohio.

Program Schedule

Sunday, January 15:

3 - 9 p.m. Exhibition of equipment, supplies, and services (Continuing through January 16-18 and remaining at Western Reserve University as a permanent exhibit)

Monday, January 16:

9:00 a.m. Welcome to the Conference

John S. Millis, President
Western Reserve University

9:15 a.m. General Remarks and Introductory Business

Jesse H. Shera, Dean
School of Library Science
Western Reserve University
Chairman of the Conference

9:45 a.m. "The International Utilization of Recorded Knowledge"

Burton W. Adkinson, Director
Reference Department
Library of Congress

10:45 a.m. "Practical Utilization of Recorded Information — The Role of the Professional Association"

Chester M. Lewis, Chief Librarian, *The New York Times*, and President, Special Libraries Association

1:30 p.m. "Men, Information, and Now Automation in the Decision-making Process"

H. R. J. Grosch, Manager — Investigations
AGT Development Department
General Electric Corporation

2:20 p.m. "Education for the Librarian of the Future"

Margaret E. Egan, Research Associate, Center for Documentation and Communication Research, Western Reserve University

3:10 p.m. "Cooperative and Centralized Information Processing — Dream or Practicality?"

James W. Perry, Director
Center for Documentation and Communication Research
Western Reserve University

4:00 p.m. "The Role of Language in the Communication of Recorded Information"

James D. Mack, Librarian
Lehigh University

Tuesday, January 17:

9:00 a.m. Panel discussion: "The Role of Recorded Information in the Decision-Making Process — Prospectus"

The way in which information should or could be used; the role of present information systems; systems of the future; automation

Moderators: W. W. Abendroth
Operations Research Group
Case Institute of Technology

Herman H. Henkle, Librarian
The John Crerar Library

"Operations Research Approach"

Russell Ackoff, Chief
Operations Research Group
Case Institute of Technology

"Management Needs of the Future"

Lawrence H. Flett, Director (retired), New Products Dept., National Aniline Div., Allied Chemical & Dye Corp.

"Recorded Information in Chemical Research"

Louis Koenig, Vice President
Southwest Research Institute

"Information Theory in Automation of Retrieval of Recorded Information"

Robert M. Fano, Associate Professor of Electrical Communication
Massachusetts Institute of Technology

"Machines for Retrieving and Correlating Recorded Information"

S. A. Alexander, Chief
Data Processing Systems Division
National Bureau of Standards

"Military Decisions – The Role of Recorded Information"

Major H. S. Wienberg
Rome Air Development Center
Griffiss Air Force Base

(Jan. 17)

2:00 p.m. Panel discussion: "Cooperative Information Processing – Prospectus"

The status of various cooperative ventures to date; steps still to be taken; problems of cooperation; additional areas for cooperation

Moderator: James W. Perry, Director
Center for Documentation and Communication Research
Western Reserve University

Metals

D. C. Hilty, Technical Advisor
Metals Research Laboratories
Electro Metallurgical Company

Pharmaceuticals

Winifred Sewell, Chairman
Committee on Pharmaceutical Abstracting
Special Libraries Association

Petroleum

H. W. Field, Vice President
Atlantic Refining Company

Science Abstracting

E. E. Hutchisson
Case Institute of Technology

Law

Vincent Biunno, Trustee
New Jersey Law Institute

Patents

D. D. Andrews
Supervisory Classification Examiner
U. S. Patent Office

Medicine

Sanford V. Larkey
Welch Medical Library
Johns Hopkins University

Wednesday, January 18:

9:00 a.m. Panel discussion: "A Program for Education of Librarians and Documentalists of the Future"

Curriculum studies required; research in progress; contemplated sources of support

Moderator: Jesse H. Shera, Dean
School of Library Science
Western Reserve University

Panel: Helen Focke, Professor of Library Science, School of Library Science
Western Reserve University

Margaret E. Egan, Research Associate, Center for Documentation and Communication Research, Western Reserve University

Robert Booth
Massachusetts Institute of Technology

Ralph R. Shaw, Professor of Library Service
Graduate School of Library Service
Rutgers University

2:00 p.m. Panel discussion: "The Role of Language in the Communication of Recorded Information"

The barriers imposed by language in communicating recorded information; within a single language; among several languages

Moderator: James D. Mack, Librarian
Lehigh University

"Language and Machines"

William N. Locke, head
Department of Modern Languages
Massachusetts Institute of Technology

"Language and Classification Systems"

Norman Ball, Executive Secretary
Interdepartmental Committee for Scientific Research and Development
National Science Foundation

"Languages and Indexes"

Charles L. Bernier, Associate Editor *Chemical Abstracts*

"Language Engineering"
Thyllis Williams, Putnam, Illinois

Invitational Evening Meetings

Monday and Tuesday evenings
January 16 and 17
as arranged

1. Cooperative Abstracting in the Field of Metals
2. Cooperative Ordnance Abstracting, Cataloging, and Indexing
3. Cooperative Pharmaceutical Abstracting
4. Cooperation in Exchange of Patent Information
5. Cooperative Petroleum Abstracting
6. Cooperative Documentation Information
7. Machine Translation

Additional information concerning the Conference may be obtained on request from Jesse H. Shera, Dean, School of Library Science, Western Reserve University, Cleveland 6, Ohio.

MINICARD DEMONSTRATION

On 30 June 1955, a demonstration of prototype Minicard equipment was held for consultants and representatives of government agencies at George Eastman House, Rochester, New York. The first public announcement of the development of this equipment was made at the November 1954 convention of the American Documentation Institute (see also, A. W. Tyler, W. L. Myers, and J. W. Kuipers, *American Documentation, 6,* 18-30, 1955). The Minicard system employs a rectangular piece of film to record both coded information and also a microrecord of a document. For lengthier documents, several pieces of film act as a unit.

The basic principle of using a unit piece of film to record both code and microrecord of document was announced several years ago in French equipment (Film-O-Rex). However, this equipment has not been generally available in the United States.

The equipment, as demonstrated, consisted of several units, whose delivery for operational use by the Air Force is scheduled for early in 1956. The design of all the units is not yet fully settled, according to the Eastman Kodak demonstrator.

The various items of equipment demonstrated included:

1. A step-type camera for recording previously prepared codes and documents on a continuous film.
2. A processor to develop exposed film.
3. A film cutter, for preparing Minicards from the continuous film after development.
4. A Minicard sorter, for simple sorting of Minicards. This unit performs operations similar to those of conventional punched-card sorting equipment.
5. A Minicard scanner, a prototype machine was used to illustrate some of the operations that this unit will be able to perform once design and construction work has been completed.

The prototype, as described at the demonstration, is able to detect any one of a number of individual designations which, for an example, might be UDC numbers or, more generally, a set of symbols in a designation may be detected provided their position relative to the start and end of the designation is known. If symbols or sequences of symbols that may be detected are denoted by capital letters, then searching and selecting operations may be directed to their combinations as defined in terms of logical combinations, viz. product, e.g.:

A . B . C . D —

sum, e.g.:

A + B + C + D —

difference, e.g.:

A - B

or complex logical relationships, such as:

(A + B) (C + D) - E

or:

A . B . C + D - E

and the like. Such detection of a multiplicity of code designation and of a configuration of relationships between them will require that a file be passed through the scanner only once. This is a great advance over earlier film sorting machines that have been restricted to detecting only one designation in a single scanning operation.

Limitations in the capabilities of the prototype scanner as described were also apparent. Within a code designation, a sequence of symbols may be detected only if its position relative to the start and end of the designation is fixed or known. This means, in practical terms, that the prototype scanner should scarcely be able to conduct searching operations on notation codes for organic structural formulas (see Staff Report, *Chem. Eng. News, 33,* 2838-2843, 4 July 1955; M. M. Berry and J. W. Perry, ibid., *30,* 407-410, 1952). The same limitations in machine capabilities would also preclude the effective scanning of encoded abstracts, (see Staff Report, *Chem. Eng. News, 32,* 866-9, 891, 1 March 1954).

The initial prototype scanner, as described at the demonstration, appears tied to conventional classification systems such as the UDC. In overcoming the limitations of the prototype scanner, experience in the mechanized searching of patents (see M. F. Bailey, B. E. Lanham, and J. Leibowitz, *Journal of the Patent Office Society, 35,* 1953) should prove helpful to the Minicard developers in designing future models.

The further development of the Minicard equipment will be followed by documentalists with more than usual interest. It seems certain that Eastman Kodak is on the verge of providing important machine searching and correlating functions needed in the complex decision-making processes of today, (see Vannevar Bush, "As We May Think," *Atlantic Monthly,* July 1945; see also Vannevar Bush et al., "Report on the Advisory Committee on Application of Machines to Patent Office Operations," Dept. of Commerce, Dec. 22, 1954).

Eastman Kodak should be encouraged to procede with the next steps in this development in order that major advances may be made in the effective utilization of recorded knowledge.

LITERATURE NOTES

The contributions toward a bibliography of documentation which appear regularly in *American Documentation* are prepared by the following members of ADI: Mildred Benton, Helen L. Brownson, Verner W. Clapp, Henry J. Dubestor, Eugene Garfield, Edith N. Rathbun, Maurice F. Tauber, and W. W. Waldo. Abstracts of papers appearing in German, Russian and Eastern European publications are contributed from time to time by Rita G. Liepina. We should welcome contributions of abstracts from readers and suggestions of books and articles to be included in the bibliography.

The American Documentation Institute is not able to supply copies of the publications abstracted. Copies should either be obtained from the publisher or issuing organization or consulted in a library.

As reported in the last issue, agreements have been made with the editors of *Chemical Literature, Review of Documentation* and *Library Science Abstracts* for the exchange of abstracts. The last installment of "Literature Notes" included a number of items taken or translated from these other three publications. Comments were solicited on the usefulness of this material to the readers of *American Documentation*. To date, seven persons have submitted comments; six of them favor inclusion of abstracts from other abstracting services; the seventh does not believe the extra time and expense is justified because his library either subscribes or plans to subscribe to the other services. It is obvious that of those who commented the majority believe the inclusion of abstracts from other services to be useful; but the response has been so small that it appears doubtful if many of the readers of *American Documentation* are interested in having the bibliography expanded. In this issue, therefore, only the abstracts prepared by the ADI Committee on Bibliography are included.

"Active documentation," [In Swedish] *Tidskrift för Dokumentation, 10,* no. 5, 53-56, 1954.

No. 3, 1954, of this journal contained an article under the above title by Carl Björkbom, who used the term *active documentation* in another sense than that which has been usual hitherto. Two contributions on this subject follow from Osvald Säfström, Librarian at the Stockholm Breweries, and Erwin Engel, Head of the Documentation Service of the Swedish Research Institute of National Defence.

ARNON, DANIEL I., (Editor, *Annual Review of Plant Physiology*, University of California) "Use of 'Personal Communications' in Scientific Reviews," *Science, 121,* 835, 10 June 1955.

Believes that authors of scientific reviews, particularly of those that appear regularly, should not include "personal communications." Their inclusion means that the reader is denied the opportunity he rightly expects of being directed to the original evidence for an independent appraisal of its significance. Moreover, similar or even better evidence may be unknown to the reviewer.

BEGUN, GEORGE M. (Oak Ridge National Laboratory) "Making Your Own Punched Cards," *J. Chem. ical Education, 32,* 328, June 1955.

Describes a simple method of making 5- by 8-inch punched cards with a galvanized iron master template and a paper punch. An advantage of the system is that notes can be taken on any 5- by 8-inch card and the card can be made into a punched card without recopying.

Bibliography on Filing, Classification, and Indexing Systems for Engineering Offices and Libraries. New York: Engineering Societies Library, 1954. (ESL Bibliography N. 9)

This bibliography consists of references to articles, books, and pamphlets on filing, classification and indexing, lists of subject headings, and hand-sorted punched-card systems suitable for small collections of engineering information.

It is divided into three parts: Part I, General information on filing, classification and indexing systems and related material on organization of technical libraries and collections; Part II, Universal systems; Part III, Special systems in general and systems for special subjects.

BJÖRKBOM, CARL, "Active documentation," [In Swedish] *Tidskrift för Dokumentation, 10,* no. 3, 30-33, 1954.

Author points out that documentalists, in order to be able to cope with problems of listing and classifying scientific documents, should induce editors and publishers to give their publications a form that make them easy to handle by the documentalists. He gives doctoral dissertations and proceedings of congresses as examples of impracticable means for scientific communication.

[Catalogs of Slavic Research Materials Abroad], *Library of Congress Information Bulletin, 14,* 8-9, 23 May 1955.

With the help of a grant from the Ford Foundation, the Library of Congress has explored the possibility of securing reproductions of the catalogs of significant Slavic research materials in Western Europe and Finland. To date, ten orders have been placed for microfilm copies of the catalogs and several deliveries have already been made, namely, by the University Library, Helsinki; Bibliotheque de Documentation Internationale Contemporaine, Paris; Societe Scientifique Sevcenko, Sarcelles, France; Royal Library in Stockholm; and Bodleian Library, Oxford. These microfilms form the nucleus of a collection of Slavic library catalogs that will enable scholars to ascertain the availability of an enlarged body of materials without the necessity of travel and extensive correspondence hitherto required.

"Commission on the Classification of Books and Maps in Libraries," *IGU Newsletter* (International Geographical Union), *6,* 12-14, May 1955.

Summarizes the work of the Commission and the information obtained from several countries about classifications in use. At a meeting in London on September 10, 1954, Dr. A. C. Gerlach of the Library of Congress pointed out that information is now sufficient to force the Commission to abandon any attempt to establish a universally accepted classification. The spirit of classification must be sought so that general principles, widely circulated and accepted, may facilitate understanding between libraries. The Commission's final report should be ready for the Congress of the Union in Rio in 1956.

Computer Directory 1955, Computers and Automation, the entire issue, June 1955.

A three part directory: "Part 1: Who is Who in the Computer Field" contains about 7500 entries; "Part 2: Roster of Organizations in the Computer Field" contains 300 entries (this roster is brought up to date in nearly every issue of the Journal); "Part 3: The Computer Field: Products and Services for Sale" contains about 600 entries classified under such headings as Adding Machines, Analog Computers, Card-to-Tape Converters, Computer Services, Consulting Services, Data Processing Machines, and so forth.

CORBY, ROY A., HAROLD J. BEHM, and ALVIN T. MAIERSON, Compilers and Editors (Battelle Memorial Institute). *A Machine System for Accepting, Storing, and Searching Engineering Data on Electronic Components.* Wright-Patterson Air Force Base, Ohio: Wright Air Development Center, March 1954.

Abstract contained in the report:

This [final] report is a summary of the research work which has produced the design of a system to collect, store in condensed form, search rapidly by machine, and disseminate comprehensive engineering data on electronic components.

The report describes the elements of a machine-sorted punched-card system for recording, searching, and tabulating data on any electronic component. It presents detailed data sheets, definitions, codes, and instructions for processing input data on a typical component group (capacitors). Fifteen special reports present similar detailed ECIC designs for fifteen component groups. A resume is presented of the work done toward the development of life-rating test methods and of that on automatic component-testing equipment.

Also presented are discussions and studies on (1) the data-collecting problem, (2) suggested organization and personnel requirements, and (3) cost estimates for building up and operating an ECIC. Three general plans for implementing the system are discussed.

CRANE, E. J., (Director, Chemical Abstracts Service), "The *Chemical Abstracts* Service — Good Buy or Good-by," *Chemical and Engineering News, 33,* 2752-2754, 27 June 1955.

Primarily an article on the research undertaken by *Chemical Abstracts* in 1954, and that contemplated for the future. The general objectives of the research program are better and wider service, economical operation, and establishment of special services. 1954 was the first year in which funds for research were budgeted by *CA*. In September 1955, Dr. Karl F. Heumann will become *CA*'s first full-time research worker.

Research efforts during 1954 were concerned with surveys of the need for and development of methods of producing interim indexes; the planning of *CA*'s new building and the equipment needed; experimenting with procurement methods and the flow of journals among abstractors; the use of ciphers in organic indexing; and experiments on the arrangement of chemical symbols in formulas for formula indexing. Other research projects either initiated or contemplated are designed to investigate the feasibility and value of a citation index; to measure the need for generic searches and devise means for meeting any need found; to test descriptor indexing; to seek means of accelerating chemical nomenclature development; and to study relations among words with the object of producing a chemical thesaurus useful in indexing and index searching.

"Documentation," *Chemistry and Industry, 24,* C2, 11 June 1955.

An editorial urging support, by chemists, of the

First International Congress on Documentation of Applied Chemistry.

"Documentation Center to Help Preserve and Share Treasures of Ancient Egypt," *Unesco Newsletter, 2,* No. 12, Page 3, 22 July 1955.

An announcement that Unesco has entered into an agreement with the Egyptian Ministry of Education for the establishment of a documentation center in Cairo. Unesco will supply financial and technical aid such as experts in archaeological and photographic documentation for a period up to three years. The center will be made accessible to historians and scientists from all countries. It will assemble complete graphic and photographic data on the monuments and other remains of ancient Egyptian civilization.

"Documentation of Applied Chemistry, International Congress," *Chemistry & Industry, 24,* 673-674, 11 June 1955.

Lists the papers and speakers on the program for the First International Congress on Documentation of Applied Chemistry to be held, November 22-25, 1955 at the Institut Francais du Royaume-Uni, Queensberry Place, London, S. W. 7.

ELLIOTT, CHARLES, "The Magnetic Tape Revolution in Library Service," *ALA Bulletin, 49,* 323-325, July-August 1955.

The article has been written with the purpose of awakening interest in the advantages of magnetic tapes as a significant addition to library service. Such recording adds at least three dimensions of activity and significance. It adds the whole world of sound; it permits the creation of unique and valuable materials through the instigation of the librarian; it permits of an organized inter-library program that provides inexpensive duplication and exchange of these materials. It is stated that "the newest and in some ways the most potent form of communication ever developed is now available at reasonable cost."

ENGEL, ERWIN, "Technical reports — a New Method of Publishing Results of Scientific Research," [In Swedish] *Tidskrift för Dokumentation, 10,* no. 2, 13-19, 1954.

The article deals with publishing activities during and after the Second World War, when ordinary methods were inadequate for dealing with the deluge of research reports resulting from the war effort. "Technical reports" — a cheap, efficient and quickly produced form of publication for internal communication — have become very popular, particularly in the U. S. A. A description is given of the organization of this work, and of the necessary secrecy regulations, code designations, and accessibility of the reports for Swedish researchers.

"Facsimile Aids Business Communications," *British Communications and Electronics, 2,* 48-52, June 1955.

Describes and pictures small and simple equipment such as the Desk-Fax Transceiver Unit, an Automatic Page Recorder, the Broadcast Unit, and the Teletape Transceiver.

"Facts of Journal Publishing," *PMLA, 59,* viii-ix, December 1954.

Presents in tabular form circulation statistics for U. S. journals in the field of modern languages and philology. Many such journals are in a precarious situation for lack of subscribers, and all but a few are subsidized, usually by a university. Persons active in the field are urged to give more than moral support to their favorite journals. For the most part, financial support of these journals is not contributed in any large measure by the persons who write for and read the journals.

Fahlström, Jan Magnus, "Course for industrial archivists." [In Swedish] *Tidskrift för Dokumentation, 10,* no. 4, 41-42 & 44, 1954.

A course for industrial archivists was held at Saltsjöbaden, near Stockholm, during November 1954. The course was the first of its kind to be held in Sweden, and some 70 delegates gathered from different types of industrial undertakings in Sweden, Finland and Norway. The main emphasis of the course was directed toward the problem of dealing with the constantly accumulating masses of paper with which every firm today is faced. At the same time, however, the value of industrial archives as source of historical and economic research was stressed. The general theme of the course was that no single all-embracing system exists for the arrangement and storing of archives. The main aim should be that every firm works out a filing system which corresponds as closely as possible to its peculiar organization and method of work. The system of classification to be adopted for the filing of documents within the framework of the plan is of minor importance.

A summary of the lectures delivered will be published by Sveriges Industriförbund (The Federation of Swedish Industries).

FRAUENDORFER, SIGMUND V. (Bibliothek der Hochschule fur Bodenkultur, Vienna), "Agricultural Library and Documentation Work," *UNESCO Bulletin for Libraries, 9,* 69-71, April 1955.

In accordance with a resolution of the Council of the International Federation of Library Associations, at its meeting in September 1954, the International Committee of Agricultural Librarians is to be revived. In addition to continuing the work of its

predecessor organization on directories and surveys of bibliographies, it will explore the problems of international exchange, of agricultural classification, and of new library and documentation developments.

GARFIELD, EUGENE (Documentation Consultant, 1530 Spring Garden Street, Philadelphia), "Citation Indexes for Science," *Science, 122,* 108-111, 15 July 1955.

Proposes a "citation index" for science literature, similar to *Shepard's Citations,* which covers court cases for the legal profession. The proposed index would serve to eliminate the uncritical citation of factually incomplete or obsolete data by making it possible for the conscientious scholar to be aware of criticisms of earlier papers. It would help each scientist to determine which other scientists are making reference to his work, thus increasing the communication among scientists. It would also be extremely valuable to the historian of science in tracing ideas and their influence. A method of preparing such an index is described and some of the problems are discussed.

GIERTZ, L. M., "ABC — a Selection of UDC Numbers for the Building Trade," [In Swedish] *Tidskrift för Dokumentation, 10,* no. 1, 4-6, 1954.

International Building Classification Committee (IBCC) operates as Sub-Committee both to International Council for Building Research, Studies and Documentation (CIB) and International Federation for Documentation (FID). IBCC has made extracts of UDC numbers having reference to the building trade. These extracts are published as an FID publication under the title Abridged Building Classification for Architects, Builders, Civil Engineers (ABC). The final editing of the publication will be complete in May 1954, after which ABC will be printed in 15 languages. The present article gives an account of the principles on which the selection has been based and of the rules to be applied in drawing up a classification for the building trade.

HERRICK, MARY D. and HILL, ADELAIDE C. "Problems of Bibliographical Control for an Area Research Program," *College and Research Libraries, 16,* 291-295, July 1955.

A discussion of the problem of controlling for users the materials being collected for the African Studies Program. Questions regarding classification and cataloging had to be settled. Neither a separate classification system nor a separate catalog was devised. Instead, there has been developed an "African Oriented Index" to the collection. "Here topics — i.e., Tribes, Cities, Regions, as well as general subjects — are listed in alphabetical order subordinated to Africa, and each time a new aspect is recorded the list is annotated." Only location symbols as they appear in the classified subject catalog are recorded. The authors call attention to the need for library staff members and faculty involved to work together in the solution of problems of control.

HICKERNELL, L. F., "Classified Bibliography on Insulated Conductors," *Electrical Engineering, 74,* 567-569, July 1955.

This article describes the new system for referencing technical data evolved by the Committee on Insulated Conductors of the American Institute of Electrical Engineers. The technique, although not highly mechanized, is innovational and may be adapted to other subjects, if the area to be covered is limited to a small number of classifications.

HILLBO, GUNHILD, "How to Find Your Way in Patents Literature," [In Swedish] *Tidskrift för Dokumentation, 10,* no. 6, 67-70, 1954.

On the basis of enquiries from other libraries regarding literature for patent searching, the author gives a list of some general reference books and periodicals on industrial property rights and particulars concerning official publications (periodicals and indexes) on patents from Sweden and other countries.

"International Classification for Patent Specifications," *Unesco Bulletin for Libraries, 9,* 95, May-June 1955.

A European Convention on the International Classification of Patents for Invention was signed in Paris on December 19, 1954, by the Ministers for Foreign Affairs of the 15 Member States of the Council of Europe. It will come into force a month after the date of deposit of the fourth instrument of ratification. Each contracting party to the convention undertakes to have its printed patent specifications or extracts marked with the complete symbols of the international classification. In most countries, the national patent services classify the patent specifications of all the most important countries in the world according to its own system. The aim of the convention is to substitute for the national systems an international one so that each service will have only to classify the documents of its own country. A working group composed of representatives of France, Germany, the Netherlands, and the United Kingdom has met several times and has worked out 4,000 new headings. The complete elaboration of the international system will take several years. Further information may be obtained from Mr. R. Gajac, Council of Europe, 26 bis, rue de Leningrad, Paris, France.

"An International Language?" Letters to the Editor from ARTHUR L. MOTET and CHARLES E. WHITMORE, *Scientific Monthly, 80,* 392, June 1955.

Motet argues that an international language is necessary and that it is fallacious to argue otherwise because there is no strong demand for it on the part of working scientists. Demand grows with supply. He points out that there is no way he can concretely express his demand by, for example, subscribing to a journal that publishes material in his field in an international language.

Whitmore replies that the question of an international language has been under discussion for nearly seventy years, yet the state of affairs is very much as it was at the outset. He believes that the greatly increased costs of printing is a greater obstacle to the diffusion of information than the absence of an accepted international language.

"IUBS Symposium on Problems of International Concern in the Biological Sciences," *International Council of Scientific Unions Quarterly Bulletin,* No. 50, April-June 1955.

The Symposium was held at the 12th General Assembly of the International Union of Biological Sciences in Rome, April 12-16, 1955. Among the topics discussed were standards, units, symbols, and terms. It was recommended that IUBS urge the universal adoption of the decimal system for international scientific publications and promote the unification of standards, units, symbols and terms in the field of biology. Also discussed was "publications." It was agreed that international support of publications should go first to abstracting and indexing periodicals, second to review periodicals, third to handbooks, lists of materials and workers, and dictionaries of symbols, and lastly to monographs of international scope. It was also recommended that abstracting and indexing journals in the field of biology cooperate and coordinate their efforts through the ICSU Abstracting Board.

KING, ALEXANDER (Department of Scientific and Industrial Research), "The Work of International Organizations and Foreign Documentation Centres," *ASLIB Proceedings, 7,* 3-11, February 1955

A stimulating discussion of the difficult features of international work, of the reasons for international activity, and of the current work of international organizations in the field of documentation. The author stresses his belief that the smaller bodies on kindred subjects, such as F.I.D. and I.F.L.A., can gain strength to exert the influence they should wield only by consolidating their resources, both financial and intellectual – i.e., by striving towards some type of federation, although each should retain its individuality. He also believes that international cooperation should be restricted to topics inherently international in nature; topics, that is, that can be studied better in common than separately. He emphasizes the fact that the strength and quality of an international organization depends on its national constituents, which must be strong and active.

KOOSER, EDWIN DeT. (Chapel Hill, N. C.) "A Bibliographic Service," *American Psychologist, 10,* 250, June 1955.

Suggests that a perpetual bibliographic service would be a valuable contribution to the science of psychology. Keysort or IBM cards could be employed. The following information on all references might be coded: date, author, field of psychology, psychological "school" of author, type of article, topics investigated, subjects employed, apparatus and tests, methodology, type of publication, language, and availability. He realizes that the initial cost of such a service would be great, but he believes its maintenance should not be difficult.

"The Literature of Forestry: An Appraisal," *Forestry Abstracts, 16,* No. 2, 157-160, 1955.

The literature of forestry is scattered in many non-forestry publications, from a microscopist's journal to a monograph in applied chemistry. The journals regularly scanned by the Commonwealth Bureau of Forestry at Oxford have grown from 849 in 1947 to 1,310 in 1955. Publications come from nearly 100 countries and appear in more than 30 languages. Of the notes in *Forestry Abstracts,* 38 per cent refer to forestry periodicals, 24 per cent to other periodicals, 18 per cent to forestry serials, and 4 per cent to other serials. The remaining 16 per cent refer to books, patents, and so forth.

LOCKE, WILLIAM N. and A. DONALD BOOTH, Editors. *Machine Translation of Languages.* Cambridge: Technology Press of The Massachusetts Institute of Technology; New York: John Wiley and Sons; London: Chapman and Hall, Ltd.; 1955.

Contains the memorandum on translation written by Warren Weaver on July 15, 1949, which started much of the work in this field; a historical account of work in the field to date by the editors; and the following chapters covering the work of researchers:

"Some Methods of Mechanized Translation" by R. H. Richens and A. D. Booth

"The Design of an Automatic Russian-English Technical Dictionary" by Anthony G. Oettinger

"A Preliminary Study of Russian" by Kenneth E. Harper

"Some Problems of the 'Word'" by William E. Bull, Charles Africa and Daniel Teichroew

"Speech Input" by William N. Locke

"Storage Devices" by A. Donald Booth

"The Georgetown-I.B.M. Experiment" by Leon E. Dostert

"The Mechanical Determination of Meaning" by Erwin Reifler

"Model English" by Stuart C. Dodd

"A Practical Development Problem" by James W. Perry

"Idioms" by Yehoshua Bar-Hillel

"Some Logical Concepts for Syntax" by Luitgard and Alex Wundeiler

"Syntax and the Problem of Multiple Meaning" by Victor H. Yngve

To be reviewed in a later issue of *American Documentation*.

MAIZELL, ROBERT E. (Olin Mathieson Chemical Corporation, Niagara Falls, New York), "Techniques of Data Searches in Chemical Libraries," *J. Chemical Education, 32,* 309-311, June 1955.

Describes the sources and techniques used in assembling and evaluating data from the literature on the basic properties of pure chemicals. Explains how it is possible to proceed systematically through a standard list of primary and secondary sources in such a way that will ordinarily reveal the information wanted with maximum speed and a reasonable degree of accuracy.

MAYOL, JOSEFINA, "Author Numbers for Spanish Names in the Literature Class," *Journal of Cataloging and Classification, 11,* 138-143, July 1955.

A description of the procedure used in setting up a system of author numbers for Spanish names in the literature class (Dewey Decimal System) at the Miami Public Library. Because of the complexities of Spanish names, English author number systems have not been adequate. An acceptable system was developed through the application of Luis F. Malaga's "Reglas y Tablas de Notacion Interna," which appeared in *Fenix,* 5(1947), 130-53.

MULLER, ROBERT H., "Microfilming Services of Large University and Research Libraries in the United States," *College and Research Libraries, 16,* 261-266, July 1955.

Information on the production of microfilm was received from all of the 21 university libraries in the U. S. holding more than 900,000 volumes, plus eight selected research, special, or public libraries owning large research collections. Information is provided on patterns of service, laboratory equipment, processing of microfilm, and prices for microfilm (including variations in rates and cost analysis). The author poses eight questions on microfilm services which are not answerable by present data.

"Nomenclature Vs. NUTTING," *Chemical and Engineering News, 33,* 2326-2328, 30 May 1955.

Reviews briefly the history and work of the nomenclature committee of the American Chemical Society, in which Howard S. Nutting of Dow Chemical, the fourth winner of the Austin M. Patterson Award, has been active. While excellent progress has been made in the past decade, the nomenclature problem has by no means been solved — especially in the eyes of those closest to it. Nutting thinks that eventually it will become necessary to provide funds for "foundation"-type research on documentation problems, instead of relying entirely on volunteers as now. Providing funds for such work is one way in which industry can contribute to solution of the problems.

"A Note on Communicating What We Have to Say," *ACLS Newsletter, 5,* 4-9, Winter 1954-1955.

There is no logical relation between the number of possible users of a scientific or scholarly publication and the importance of having the publication available. The basic fact is that the apparatus of commercial publication or any slightly modified approximation to it is too expensive a mechanism to provide a solution of the scholar-to-scholar communication problem. Frequently, this high cost is disguised by subventions, volunteer services, and so forth, but even then the process affects only borderline cases and does not reach to the heart of the question. The realization that subventions are expended largely to cover a publisher's overhead costs has led to a breakdown of the ACLS system of assistance to the publication of scholarly works with funds supplied by the Carnegie Corporation. One of the first rules of foundations is not to permit their funds to become committed in perpetuity. The problem of scholar-to-scholar communication must be faced as a social necessity for which society must assume the responsibility, and all new devices must be examined with a view to developing a structure which will function effectively at the lowest social cost. There is need for much experiment; not so much now with new methods of production, but with new methods of distribution in order to design a new operation to assure communication between scholar and scholar.

The article also includes a discussion of the importance of making available to those outside the world of professional scholarship the current advances in the humanities and an understanding of the contributions which these advances can make to our society.

PATTERSON, LOUISE D., "A Punch-card Abstract File on Solid State and Transistor Literature." 48 pp. Lexington, Mass., 12 Jan. 1955. (Mass. Inst. Tech. Lincoln Lab. Tech. Rpt. no. 74)

This report describes the coding and filing system used with Lincoln Laboratory's abstract collection on solid state and transistor literature. It also describes a modification suitable for use with other punch-card collections on special fields in physical science. The special features of this system are a rapid mnemonic code which allows for considerable expansion and revision, and an ordered subject file, the tipping bin, which reduces searching time and facilitates browsing.

Records of the Intergovernmental Copyright Conference, Geneva, 18 August - 6 September 1952. Paris: Unesco, 1955.

Contains the official records of the conference which drew up the Universal Copyright Convention. In addition to the text of the Convention and protocols, this book contains a list of signatories, of participants, of the officers and secretariat of the Conference, the report of the general rapporteur, the recommendations, the minutes, and working documents. It also has indexes of states, organizations, and personalities, of articles of the Convention, of working documents, and a subject index.

RIDENOUR, LOUIS N., "Computer Memories," *Scientific American, 192,* 92-100, June 1955.

Discusses the requirements and general problems in designing machine memories. A computer memory device is comparable not to the memory functions of the human brain but rather to the physical information-storage devices used by men — the scratch-pad, notebooks, and other current records, as well as permanent references. One big difficulty lies in the fact that the language of men must be translated into the binary language of the machines. At the output end the machine itself can perform the translation, but on the input side men usually have to do the translating to the machine.

The three classes of memories are the inner or high-speed memory which stores data and instructions in current use; the intermediate-speed memory, the analog to the human's notebooks and files of documents; and the large-capacity storage memory, corresponding to the library. The first two classes of memories are erasable and should be capable of storing up to 6,500 and 100,000 English words respectively. The third class should be able to store up to 100 million English words. Existing high-speed memories and those under development are of several types: the vacuum-tube toggle circuit, the acoustic-delay, the electrostatic, the magnetic-core, and the ferroelectric. The favorite device for the intermediate-speed memory is the magnetic drum; magnetic-core arrays are also promising. Comparatively little work has been done on the large-capacity storage memories. Many computers are still tied to punched cards; others use magnetic tapes. At present computer operating speeds the punched cards are an anachronism and the tapes also have certain disadvantages — acquisition time is slow and corrections and additions to the information stored are difficult to make. Gilbert W. King is working on a promising new photoscopic storage technique. Taking advantage of the fact that a great density of information storage is possible through the use of high-resolution photographic emulsions, he is developing a system that would store up to one half million words on a disk the size of a 12-inch phonograph record.

"Routed to Chemical Plants — A Data Cruiser is touring country; machines aboard unearth information buried in scientific records," *Chemical and Engineering News 33,* 2944, 11 July 1955.

The Benson-Lehner Corporation has constructed a mobile "Data Cruiser" to tour the country and to demonstrate to chemical plants a number of machines devised for data processing. The machinery displayed includes the Oscar, which takes test data from the oscillograph and converts it into digital form on IBM cards; the Electroplotter which plots graphs of the data taken from the IBM cards; and the Boscar which projects film data on a screen and makes measurements. The company is also developing a profile to aid in the seismographic work of oil companies.

RUBENSTEIN, ALBERT H., Editor, *Coordination, Control, and Financing of Industrial Research,* New York: King's Crown Press, Columbia University, 1955.

This volume is the fourth in a series reporting the proceedings of the Annual Conferences on Industrial Research. The small group discussion sessions include one on "Technical Communication and Report Writing." The informal discussion largely concerns the use of committees and the preparation of readable technical reports (pp. 408-414).

TAUBE, MORTIMER, "A Reply to Dr. Warheit," *College and Research Libraries, 16,* 284-285, July 1955.

A reply to the report by I. A. Warheit on a study of coordinate indexing described in this issue of *AD.* Dr. Taube devotes his attention to the clarification of four matters discussed by Dr. Warheit: (1) that the figures in the paper are based on only 200 items posted and indexed, (2) that there may have been a confusion of the indexing of a document with the completed index to Uniterm form, (3) that an installation involving some 50,000 items shows that posting is not as time-consuming as claimed by Dr. Warheit,

and (4) that although it is admitted that browsing is not readily permitted in a coordinate index, this may be a desirable feature in a catalog which has to be guarded for security reasons.

TELL, BJÖRN, "Addressing Machine in Catalogue Work," [In Swedish] *Tidskrift för Dokumentation, 10,* no. 5, 49-52, 1954.

Simplification of office work appears to tend towards common language machines; the embossed address plate has an important role in this connection. The article shows how library work as well can be simplified by the use of address plates and addressing machines. Experience is related from German and British libraries and from the University Library in Oslo, but in particular the routine adopted at the Library of the Stockholm School of Economics is described.

(For almost ten years the Gary, Indiana Public Library has been using addressing equipment in this way – Ed.)

THORNTON, JOHN L. and R. I. J. TULLY. *Scientific Books Libraries and Collectors.* London: The Library Association, 1954. 288 pp.

A bibliographic approach to the history of science, recording the major writings and definitive editions of all important scientists from the earliest times up to the end of the nineteenth century. There are chapters on scientific literature before the invention of printing; incunabula; scientific books of the sixteenth, seventeenth, eighteenth and nineteenth centuries; scientific societies; periodicals; scientific bibliographies and bibliographers; private scientific libraries; publishing and bookselling; and scientific libraries of today. There are a bibliography and a name and subject index. (Taken from *Unesco Bulletin for Libraries,* May-June 1955).

"Unesco's 1955-56 Bibliographical Programme," *Bibliographical Newsletter of the Libraries Division of Unesco, 4,* 1, 1-9, January 1955.

A general survey of Unesco's bibliographical programme including its work and projects with respect to general bibliography, translations, the humanities, the social sciences, the natural sciences, education, and mass communication.

VOLWILER, ERNEST H., and ARTHUR C. COPE, (Chairman, Board of Directors, and Chairman, Committee on Publications, American Chemical Society), *"Chemical Abstracts* – Millstone or Milestone?" *Chemical and Engineering News, 33,* 2636-2639, 20 June 1955.

Based on a series of studies made by the Committee on Publications over a period of several years, it has been decided that *Chemical Abstracts* should be considered a service rather than a journal. The following prices, announced for 1956 will put the journal on a self supporting basis

	Complete Volume	Abstract Issues Only
Members, personal use	$ 20	$ 15
Colleges and Universities	80	65
All others	350	320

In 1955, *Chemical Abstracts* received $145,000 from Chemical Society dues, but will have an additional deficit of $341,000, about 2/3 of which will be made up by the funds realized from corporation associate payments. For the past two years, the corporation associates have made up the deficits of *Chemical Abstracts,* but this plan will not suffice for the future. The 1955 budget of *Chemical Abstracts* exceeds $1,000,000 and is expected to approach $2,000,000 by 1960. Four possibilities for solving this financial problem were considered: curtailed breadth of coverage, 2) appeal for contributions from industry to meet yearly deficits, 3) apply to the Federal government for support, 4) establish a price schedule which would make *CA* self supporting. "No convincing arguments were advanced in favor of any of the first three proposals .... Contributions, no matter how defined (allocations or donations from industry or government), are unsound as foundations for support."

WARHEIT, I. A., "A Study of Coordinate Indexing as Applied to U. S. Atomic Energy Commission Reports," *College and Research Libraries, 16,* 278-284, July 1955.

A report of a study on the application of coordinate indexing to AEC reports. Such matters as the number of cards used, the quantity of postings, the rate of postings and a subsequent estimate of maintenance costs, and the efficiency of the system are considered. The author writes: "Almost as soon as the tests began, four things became apparent. First, there were an inordinately number of false drops. Second, many items could not be retrieved. Third, the absence of any descriptive information or abstract made many of the searchers feel they were hunting blind and brought immediate protests. Fourth, certain key Uniterms were required in a large percentage of the searches and since these cards usually had the most entries their use was often the slowest. As a result, usually only one or, at the most, two searches could be conducted simultaneously at the Index. The fact that the absence of one Uniterm card from the file nullified much of the usefulness of the entire index also made the prospect of losing a Uniterm card frightening." Attention is given to a further analysis of these difficulties, based on the indexing and posting of 200 items. It is also pointed out that the coordinate indexing did save one-third of the catalog space, and indexing went quickly

if the indexer did not go beyond the title, section headings and abstract. Because of the negative results, the AEC librarians suspended further work on Uniterm indexing to await the results of other tests being made. (A reply to this article by Mortimer Taube appears in this issue of *AD*).

WEITLAUF, FREDERICA M. (Librarian, The Timken Roller Bearing Company, Canton, Ohio), "Special Classifications — Wanted: Subject Heading Lists, Classifications and Assistance with Special Terminology," *Special Libraries, 46,* 88-89, February 1955.

A brief report prepared for the SLA Committee on Special Classification, soliciting information from members about their own special classifications and collections of terminology used for indexing, classifying, filing, searching, and so forth. The Committee is compiling a bibliography of subject heading lists and classification schemes and is investigating the application of special classifications to mechanical methods of literature searching. It has made a special study of the ASM-SLA classification for metallurgical literature because it may be adopted internationally and would serve as a "guinea pig" for mechanical literature searching. It will probably be tested with the searching system being developed by Perry and Kent at Western Reserve University.

[Western Reserve University Establishes a Center for Documentation and Communication Research], Press Release Issued by Western Reserve, May 1955.

The program of the new center will have five major phases: research to define techniques and principles of documentation; service on a contract basis to industrial, governmental, and educational organizations in improving their systems of information organization; liaison and consultant service to keep industry, government, and education informed of current developments in documentation; workshops for the non-librarian on practical applications of documentation principles; and seminars in documentation for professional librarians and students of library science. The Center is under the supervision of Dr. Jesse H. Shera, Dean of the School of Library Science, and is headed by James W. Perry and Allen Kent, Director and Assistant Director respectively.

"Which Notation?" *Chemical and Engineering News, 33,* 2838-2843, 4 July 1955.

Reviews the efforts in recent years to study and evaluate notation systems or ciphers for designating molecular structures, particularly the work of the Commission on Codification, Notation and Punched Cards of the International Union of Pure and Applied Chemistry and of the U. S. National Research Council, which conducted practical tests of several different systems. The NRC study showed that none of the systems were ready for international adoption. Since that time some of the systems have been revised and one new composite system has been proposed. The 18th Conference of the International Union of Pure and Applied Chemistry meeting in Zurich in July 1955 is expected to write the next chapter in the story. Some persons closely concerned with notation problems say that a great deal more testing should be done before any system is recognized officially. Once any notation system is introduced into widespread use in libraries, information centers and personal files, large amounts of time, effort and money will be devoted to coding and decoding structural formulas. Failure to develop the best possible notation system now can result in much unnecessary expense in the years ahead.

WILBUR, PAUL C. (Vice President, Director of Research, Food Machinery and Chemical Corp.), "Starting Research Projects," *Chemical & Engineering News, 33,* 2134-2135, 16 May 1955.

Adequate literature search cannot be over emphasized as a start toward determining novelty. However, what was undeniably true before World War II, when access to the record was free and complete, may not be quite so true today. Immense quantities of government-sponsored research, mostly classified and unabstracted, and lack of access to research results from Iron Curtain countries change the significance and cost of literature searching. The patent literature is a further information source on novelty. In addition to indicating patent possibilities, a patentability search can also: give clues to unpublished research; indicate paths for the project around existing projects or methods; show what organizations are active in the field and to what extent; and show reasons why the proposed research is not likely to be successful, based on unpublished results not otherwise accessible.

NEWS NOTES

Prepared with the assistance of Mrs. Kathrine O. Murra, International Organizations Unit, Library of Congress.

ADI ANNUAL MEETING — Philadelphia, November 2-4, 1955.

As previously announced the annual meeting of the American Documentation Institute will be held in Philadelphia at the Hotel Penn Sherwood, 39th and Chestnut Sts. on November 2, 3, and 4, 1955. The general theme will be, "Information — a National Resource." A more detailed statement of the program appeared in *American Documentation* for July 1955, page 175.

SPECIAL LIBRARIES ASSOCIATION PLANS DOCUMENTATION DIVISION

Subsequent to a round table meeting at the Special Libraries Association convention in Detroit, on June 15th, the Executive Board of the SLA received a petition, signed by the requisite number of members, for the formation of a Division of Documentation. Prior to this time the SLA has had only a Committee on Documentation, created to advise the Executive Board on documentation problems and the role of SLA in this field.

STANDARDIZATION IN LIBRARIANSHIP AND DOCUMENTATION

The American Standards Association, Sectional Committee Z 39, "Standardization in Library Work and Documentation," was reactivated in New York on April 29th, by its chairman Ralph H. Phelps, Librarian of the Engineering Societies Library. Committee Z 39 is concerned with "standards for concepts, definitions, terminology, letters and signs, practices, methods, supplies and equipment used in the field of library work, and the preparation and utilization of documents." Through the parent organization, the ASA, Committee Z 39 maintains liaison with Technical Committee 46 (T/C 46) of the International Standards Organization.

Though the April meeting was largely devoted to organizational problems, the group did consider a report on activities of the Special Libraries Association in promoting standardization of periodicals.

The following five sub-committees were reactivated: "Abbreviations for Periodicals;" "Layout of Periodicals;" "Indexing;" "Bibliographic Citations;" and Cyrillic Transliteration." Harold Oatfield has been appointed chairman of the first of these sub-committees, the remainder are yet to be designated.

The American Documentation Institute is represented on Committee Z 39 by Dr. Williamina A. Himwich, Galesburg, Illinois.

TECHNICAL WRITERS AND EDITORS FORM INDEPENDENT GROUP

At a meeting in New York City on May 12th and 13th the Association of Technical Writers and Editors, which heretofore has been affiliated with the American Documentation Institute, voted to dissolve its formal ties with the ADI and establish themselves as an independent association. In taking this action the group approved the following statement:

> "We owe a great debt of gratitude to ADI for its sponsorship and genuine hospitality. We feel that it is our duty, in some way, to continue a bond of mutual professional interest with your organization. We will be happy to consider any means which you can suggest for a friendly affiliation and occasional joint meetings with ADI."

To the newly-formed TWE the ADI has sent best wishes for all success. For their part, the editors of *American Documentation* invite contributions from this new organization. We have been informed that TWE does not at the present contemplate the publication of a journal of its own. The pages of AD are open to it as one of the best "bonds of mutual professional interest." We trust that between the Technical Writers and AD there will develop the happy working relationship that now operates so successfully for AD and the Division of Chemical Literature of the American Chemical Society.

RESEARCH IN SERIAL PUBLICATIONS

The Serials Round Table of the American Library Association is establishing a clearing house for proposed research on serials. Reports of projects having to do with acquisition, cataloging, documentation, micro reproduction, standardization, and publication of serials are of primary concern to this new service. Further information concerning these clearing house activities can be obtained from Harry Dewey, 811 State St., Madison 5, Wisconsin.

CURRENT ARTICLES UNLIMITED

Following in the pattern of *Contents in Advance*, a new service, *Current Articles Unlimited*, has just been announced. This publication will present photoduplicated copies of contents pages arranged by broad subject fields in the sciences and technologies. *Current Articles Unlimited* is published by the Spartan Co., 18 East 17th St., New York 3, N. Y.

INTERNATIONAL CONGRESS ON DOCUMENTATION OF APPLIED CHEMISTRY

The first International Congress on Documentation of Applied Chemistry (see *American Documentation*, April 1955, p. 127) will be held in London, November 22-25, at the Institut Francais du Royaume Uni, Queensberry Place, South Kensington. The program will be largely devoted to reports of national activities, that for the United States to be presented by Dr. Melvin G. Mallon of Purdue University. In addition the Congress will consider studies of particular problems. Dr. Ralph R. Shaw, Graduate School of Library Service of Rutgers University will discuss "Publications, Production and Reproduction;" Dr. E. J. Crane, of *Chemical Abstracts* will report on "Indexing;" and there will be further consideration of such topics as "Multilingual Technical Dictionaries;" "Mechanical Methods;" "Languages Problems;" and the like.

The registration fee for the Congress is two guineas, and applications should be made to the Honorary Secretary, International Congress on Documentation of Applied Chemistry, 56 Victoria St., London S. W. 1.

TRANSLATION MONTHLY ISSUED BY THE JOHN CRERAR LIBRARY

Following the establishment of the Translation Pool of the Special Libraries Association at the John Crerar Library, 86 East Randolph St., Chicago 1, Illinois, that library has announced the publication of an eight-page serial, *Translation Monthly*, which will list, alphabetically by author, current acquisitions of the SLA Translation Pool.

The Translation Pool, which was inaugurated by the Special Libraries Association and is still operated under its direction, is a rapidly growing collection of translations of scientific research publications deposited by government agencies, technical societies, universities, industrial companies, and individuals. These translations have been donated to the Pool for use by any who may be interested in them for private use and research. Materials in the Pool include translations from all languages except Russian. Russian translations are available from the Science Division of the Library of Congress, Washington 25, D. C.

Copies of any translations in the Pool are available from the John Crerar Library at regular photocopying prices.

Publication of the new serial, *Translation Monthly*, will begin as soon as 310 subscriptions have been received. The subscription rate is $5.00 per year, and subscriptions are accepted for only the calendar year beginning with the issue for January 1956. Payment should be drawn to the order of *Translation Monthly* and should be sent to the John Crerar Library at the above address.

UNESCO SPONSORS SCIENTIFIC SERIALS BIBLIOGRAPHY

UNESCO is sponsoring a cooperative plan for listing scientific periodicals showing where each is abstracted. The goal envisaged by the International Advisory Committee for Documentation and Terminology in Pure and Applied Science is to provide for each scientific field a list of periodicals somewhat similar to *World Medical Periodicals*. Work will be divided into five successive stages as follows: Compilation of a preliminary list of scientific periodicals published in each country (this may not always be necessary); amplification of listed particulars of each periodical on index card in prescribed form; ascertainment and recording on the cards of the extent that each primary periodical is covered by the main existing abstract services, and action to improve this; submission of copies of completed cards to UNESCO, which will classify and index them and be able to reproduce selections photographically in list form; publication as a book — for each subject field — complete with appropriate indexes.

Participating countries are Canada, Denmark, Egypt, Finland, France, Spain, the United States.

MEXICAN SCIENTIFIC AND TECHNICAL DOCUMENTATION CENTER

In 1951, UNESCO, at the request of the Mexican Government, established a Scientific and Technical Documentation Centre in Mexico to facilitate industrial development. The Centre now has more than 2000 periodicals from all over the world and is said to be the richest collection of scientific and technical periodicals in Latin America. It operates photoduplication, bibliographical and other reference services designed to coordinate Mexican literature resources and promote documentation and librarianship throughout Latin America. During the second quarter of 1954, the photoduplication service reproduced 7575 pages of material. The Centre prepares bibliographies on request, provides a translation service and distributes bibliographical or "Technical Cards" of recent material on a monthly basis.

The chief activity of the Centre is publication of

the *Boletin del Centro de Documentación cientifica y tecnica de Mexico*. Begun in 1953, it is a bibliography of periodical articles arranged by subject. It purports to provide a survey of the scientific output of Latin America and the rest of the world. The *Boletin* is distributed by subscription and exchange to some 1700 readers. The UNESCO experts have now turned over the full management of the Centre to Mexican technicians.

SCIENTIFIC DOCUMENTATION IN URUGUAY

The Uruguay National Commission for Bibliography has established a sub-committee to act as a national committee for questions of scientific documentation as they pertain to the International Advisory Committee on Documentation and Terminology in Pure and Applied Science (IAC Doc Ter Pas) of UNESCO. The sub-committee will aid the Centro de Documentacion in publishing an abstract bulletin of Uruguayan scientific periodicals. It will also organize courses of instruction in the use of bibliographical tools.

SCIENCE ABSTRACTING IN NORWAY

Norway has set up an Interim Committee on Science Abstracts Service. It represents the Norwegian Research Council for Science and Mathematics, the Agricultural Research Council of Norway, and the Norwegian Research Council for Science and Humanities. It is hoped that this will develop into a Norwegian Committee for Scientific Documentation which can affiliate with IAC Doc Ter Pas.

EASTERN JOINT COMPUTER CONFERENCE

The Eastern Joint Computer Conference will be held at the Hotel Statler in Boston, Mass., on November 7-9, 1955. The keynote speech will be delivered by J. G. Brainerd, Director, Moore School of Electrical Engineering, University of Pennsylvania. Subsequent sessions will deal with such topics as: The Role of Computers in Business; Cards, Tapes, and Other Records in Electronic Accounting Systems; Trends in System Design; Communication and Compatibility Among Electronic Computers in Business and Industrial Use; and Implementing an Industry Wide Standardization Program. The Conference will be summarized by Jay Forrester, Director, Digital Computation Laboratory, Massachusetts Institute of Technology.

Documentalists will be particularly interested in the discussions of Document Processing by R. H. Gregory, School of Industrial Management, M. I. T.; Developments in Programming Research by Charles W. Adams, Westinghouse Electric Corporation; and Storage and Retrieval of Information by Louis N. Ridenour, Lockheed Aircraft Corporation.

Advance Program and further details regarding the conference may be obtained from the Association for Computing Machinery, 2 East 63rd St., New York 21, N. Y.

LETTER TO THE EDITOR

THE LIBRARY OF CONGRESS
Washington 25, D. C.

August 3, 1955

Editor,
AMERICAN DOCUMENTATION

Dear Sir:

David H. Stevens in "The Role of the Foundation in Documentation" (*American Documentation* VI: 57-62, April 1955) gave an excellent presentation of the development of the application of microfilm to research. No one who knows anything about that development will fail to recognize Dr. Stevens' "foundation" as the Rockefeller Foundation, or will fail to regret that Dr. Stevens has omitted to describe the role of Dr. David H. Stevens in that development. Flourishing microfilm laboratories in libraries and archives all over the world produce millions of feet of microfilm a year in mute testimony of Dr. Stevens' personal interest, and it is not too much to say that the readiness with which the word "microfilm" jumps to the lips of every scholar confronted with a problem in documentation is a result of the successful application of this medium which Dr. Stevens promoted.

It is pleasant to be able to append to his article a footnote to the effect that a checklist of microfilms made under the Rockefeller Foundation-ACLS wartime project (described by Dr. Stevens on page 61 of his article) has now appeared (*British Manuscripts Project: A Checklist of the Microfilms Prepared in England and Wales for the American Council of Learned Societies, 1941-1945*. Compiled by Lester K. Born, Coordinator of Microreproduction Projects. Washington: The Library of Congress, 1955. 179 pages. 29 cm) Unfortunately, a correction must also be offered to one of Dr. Stevens' statements. The Rockefeller Foundation-ACLS project did not succeed in securing for this country the manuscript indexes of the Public Record Office. The procurement of these, which would cost some $7,000, is still under consideration.

Sincerely yours,

Verner W. Clapp
Chief Assistant Librarian

AUTHOR INDEX

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